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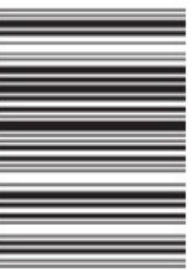


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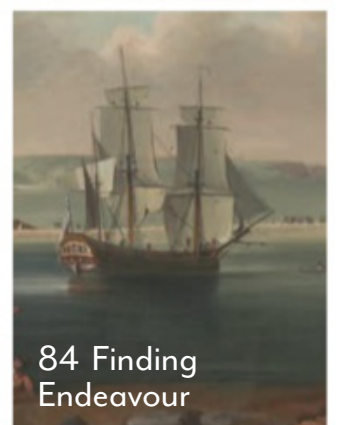
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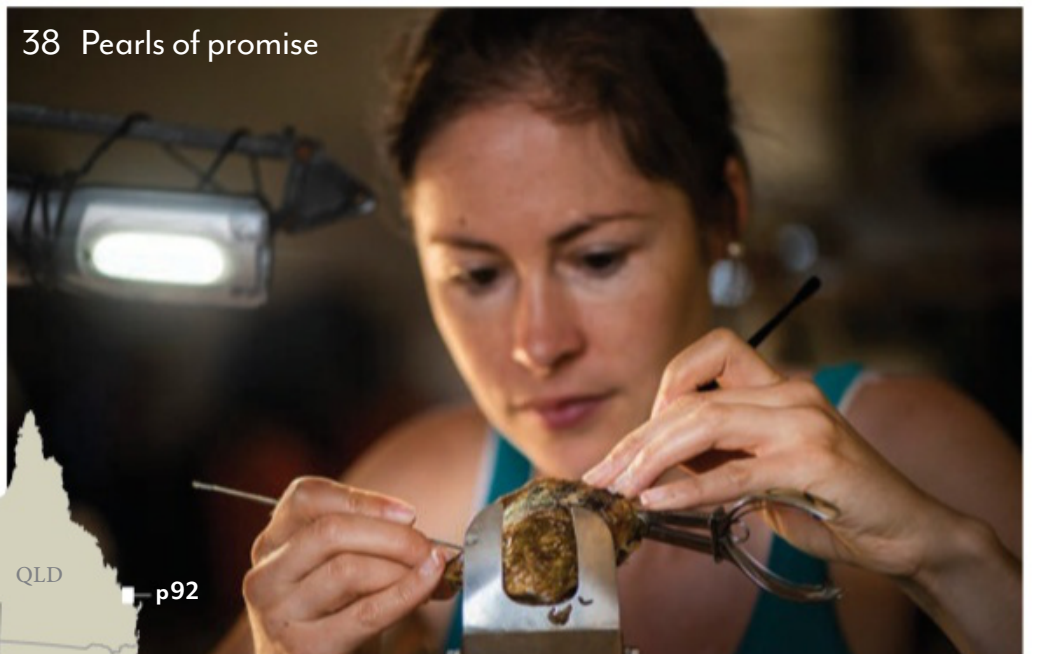


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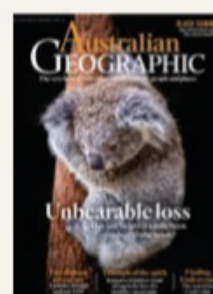
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ON THE COVER

Photographer **Drew Hopper's** image of a rescued koala joey was taken while on assignment for *Unbearable loss*, page 54, which investigates the species' precarious hold on survival in the aftermath of the 2019–2020 bushfires.

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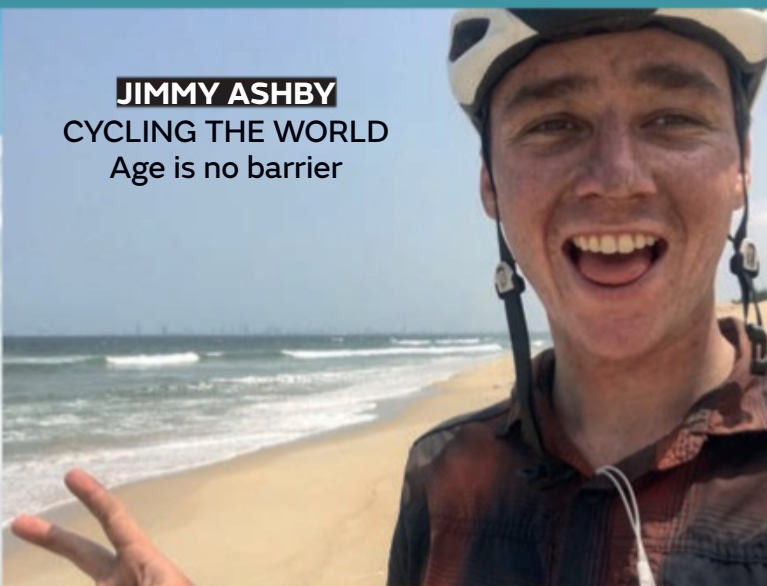
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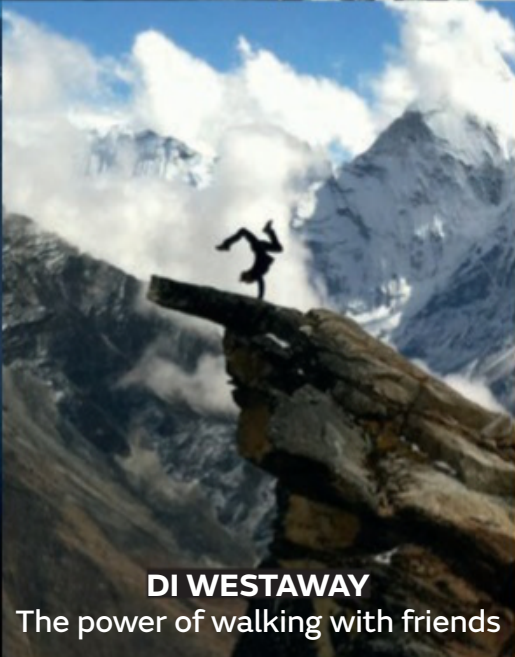
VALERIE TAYLOR

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Making sense of our loss



AS WELCOME rain pelts down across many parts of southern and eastern Australia, many are left counting the cost of the 2019–20 record-busting bushfire season. And it may not be over yet.

But good rains have eased the emergency in many of the worst-affected parts of the country, and in others there's little left to catch fire again.

Has it been Australia's worst-ever bushfire season? How do we measure notions such as worst? Of course, it must start with loss of human life and this season we have lost 33 loved and valued individuals, among them nine brave firefighters contributing their time and expertise and ultimately their lives for the sake of others. Each one is a tragedy that radiates out – far beyond the name or face that we see on the television – to engulf family, friends, communities and the whole nation.

Homes and property destroyed is another measure. What more potent symbol of destruction is there than a homeowner standing dazed among the smoking ruins of a house with just a brick chimney left standing?

But earlier fires have resulted in far greater losses of life and property and total area burnt (see page 44). So what is it that makes these most recent fires the worst in Australia's history, as is being widely accepted?

We are undoubtedly witnessing a shift in the public perception of such disasters as a natural and unavoidable part of our Australian way of life. They are perhaps increasingly likely to be viewed in the broader context of the dramatic and accelerating effects of climate change on our unique environment and ultimately to our way of life on this continent of extremes.

What's been remarkable about this latest bushfire emergency is the extent to which the damage done to our natural environment has become the focus of assessments of its overall impact.

Concern for irreversible losses of natural landscape and harm done to vulnerable native faunal species (see page 54) has dominated much of the reporting of the crisis across traditional and social media. This has led to outpourings of anger, grief, calls to action and accountability, and an avalanche of charitable financial contributions from all over the world.

What lasting effect this will have on public policymakers and individuals will depend largely on ensuring that

the lessons learnt this season, especially by those of us fortunate enough not to have been directly affected by the fires, aren't lost when the smoke clears.

Someone unlikely to ever forget the 2019–20 fires is regular AG contributor Quentin Chester, a long-time resident of and huge advocate for the natural wonder that is Kangaroo Island in South Australia. Despite his first-hand experience of the catastrophe that took place there in January, we are grateful that Quentin found time to write about his personal sentiments of seeing his beloved island all but destroyed and many of his good friends so deeply affected during those dark days.

As the year wears on we will continue to report on the after-effects of this record bushfire season. We will track recovery efforts of communities and natural environments, and seek to understand more and more the consequences of our changing climate and how we can all play a part in mitigating its effects.

And, while on that subject...don't forget to turn off your lights for Earth Hour from 8.30–9.30pm on Saturday 28 March.

Chissie Goldrick

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Tim (left) and Andrew head underground, exploring an opal mine in White Cliffs in western NSW.



Notes from the field

Highly respected wildlife photographer Esther Beaton shot her first AUSTRALIAN GEOGRAPHIC feature in 1996, travelling to far north Queensland to document cane toads (AG 44). But her latest contribution (page 38) took her just a few kilometres from her NSW Central Coast home. “When I first heard of pearls being farmed in a local estuary, I assumed they were introduced and wasn’t very interested. But when I learned a native oyster that naturally grew here was involved, I was hooked,” Esther says. “Unlike other assignments with hardships like tough hikes or long hours, this job was ‘cushy’: no stomach-churning sea voyages, just motoring across glassy smooth estuary surface waters, seabirds wheeling overhead. To get my camera deep enough for the underwater shot I needed I had to lean a long way over so asked someone to hold my legs firmly. They didn’t! I stayed out of the water but bruised my hips. I’m proud of the mysterious story-telling photo I got (p39), but more proud of befriending the people involved. The story

turned out to be of plucky Aussies, determined and resourceful, with a deep love of and care for their environment.”

Tim the Yowie Man found himself far from water as he and Andrew Gregory headed into the desiccated NSW far west to see how prolonged drought is affecting outback communities (page 72). “I didn’t know what to expect in Wilcannia as my last visit there was with my dad about 30 years ago,” Tim recalls. “It was after dark and we had car problems. Due to social unrest the local cop said the only safe place to stay overnight was the gaol. So that’s where we bunked down for the night! The town has changed so much since then and is far more welcoming, showcasing both its Indigenous and European heritage. Now, instead of driving through town with the doors locked and windows wound tightly up, travellers are staying overnight in friendly accommodation, from B&Bs to riverside cabins. To continue to prosper, all the town needs now is some water in the Darling.”

Features editors: Joanna Hartmann, Hannah James

Regular columnists: Bruce Elder, Dr Karl Kruszelnicki AM, John Pickrell, Fred Watson AM, Kel Richards, Tim the Yowie Man, Peter Rowland

More contributors: Carolyn Beasley, Esther Beaton, Linda Brainwood, Quentin Chester, Andrew Gregory, Drew Hopper, Phil Jarratt, Grahame McConnell, Ron Miller, Michael Payne, John Pickrell, Nick Rains, Mike Rossi, Don Sands, Michael Smith, Jessa Thurman, Tim the Yowie Man



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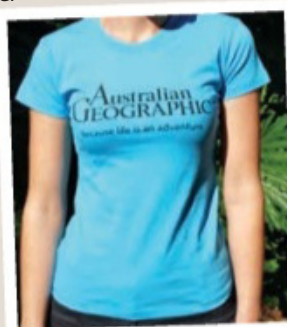
FINDING BILLY

It was fascinating to see in *Living memories* (AG 153) the picture of a bread carter handing a loaf to a woman in 1935 during the Great Depression.

We are reasonably sure it is my mother's father, William Adnet Stonnill, who would have been about 32 at the time. He was of small stature, 5ft 4½in (about 1.64m) and was a sometimes successful jockey when young.

We are in possession of a 1964 Buttercup Bakeries newsletter that features "Billy" when he was 70 and had clocked up 48 years of service! We also have a cutting from the *Sunday Mirror* of 8 March 1964 naming Buttercup Bakeries as employer of the year because Bill, having turned 70 and unable to get a car licence, was being kept on with his horse Tom. The article says they had been together for 20 years and were the last of the horse-and-cart bakoos.

Bill Nolan, Jewells, NSW



WRITE TO US!

Send us a great letter about AG or a relevant topic for the chance to be our featured letter and win an AG T-shirt.

fire there was a huge number of snakes and other animals concentrated in this area and now, some years later, you would not know there had been a major fire.

One wonders whether either the government or insurers could prod homeowners into such protective actions, which would mitigate effects of such terrible fires.

With best wishes to your magazine, which I've subscribed to for many years.

DR PHILIP M. FINCH, SOUTH PERTH, WA

ED: Thanks, Philip, we will look into preparing some advice about protecting homes and properties against bushfire in a future issue.

GET ON THE RIGHT TRACK

I have just been reading your article about the Junction Road/Sandy Blight Track in the Northern Territory and Western Australia – *Under a desert sky* (AG 153).

Could not agree with you more regarding how great the drive along the track is, though I have issues with the instructions provided on how to get to the start of the track. In the article it advises going west from Alice through Glen Helen.

While this is correct, it failed to mention the requirement to then take a side track (70–80km) to get across to Papunya and then west along the Kintore (Kiwirrkurra) Road for another 250km. Without knowing this, people could easily carry on round the Mereenie Loop and head back to Hermannsburg, or across to Kings Canyon. From experience I can say that a lot of people don't look at a map before heading off and could easily be caught out.

The much easier way, though less enjoyable, is to head north from Alice Springs along the Stuart Highway (20km), turn left onto the Tanami Road (135km) and then take the Papunya turn-off. In 100km you will be in Papunya, where the

FISH FAN

As a subscriber I really enjoyed reading your feature *Underwater and underrated* (AG 154). Like Professor Brown, I too have grown up with pet fish such as goldfish over the years and not only have I enjoyed observing them closely but I have also found these beautiful, magnificent creatures to be absolutely intelligent! I'm glad I'm not alone and thank you, Professor Brown, for reinforcing this belief that fish are clever and intelligent.

OLGA GEORGOPOULOS, MALVERN, VIC

BE PREPARED

The bushfires in our state and especially over in the east have weighed heavily on our minds over the last few

weeks. Constant images in the media of terrible fires have prompted me to put further thought into fire protection at home.

I wondered if an article of hope for the future could be considered by AG with information on how individual properties can be protected.

I have an image of our property in the Margaret River region that demonstrates the ability of fire protection to save a property after a major bushfire, which occurred in 2011. This fire destroyed about 40 houses.

This automatic system, coupled with clearing and possibly some help from above, protected the house and the immediate environs. Following the



adventure begins. Keep up the great stories. Haven't missed an issue yet, and don't intend to.

JIM EINAM, ALICE SPRINGS, NT

ED: Hi, Jim. You're spot-on regarding the lack of side-track mention and the potential for misadventure. The Tanami Road suggestion is a great one; it is far more direct, albeit not as scenic as the corrected route.

ANOTHER RED HERRING

Dearie dear, oh my! Here we are in the land of the long red sunset, and along comes Evan Holt (Your Say, AG 154) to claim sovereignty over our cosmos and intellectual property rights over our weather. Farmers (me included) all over our land have used the "red sunrise/sunset" jingle in their day-to-day living for generations. If it works (and it does), use it. Did this gem arrive here with the First Fleet in a convict ship? NO!

It is written – wait for it – in the Bible. Yes, the Bible! Pretty much all translations! Try reading the Gospel of Matthew 16: 2–4. Because this was written almost 2000 years ago, it presents a bit of a problem for the English gentleman and his shepherds.

I love Dr Karl and always read his column. I agree a red sunrise does not always result in precipitation, but it often signals a change in the prevailing weather pattern, even if it is only a dry change, and we've had plenty of those lately.

JOHN RYAN, GATTON, QLD

HIDDEN DRAGON

I really liked the article and pictures of the West Australian pebble dragon (Geobufo, AG 154).

In June 2016, I found a pebble dragon in western Queensland, at the old transcontinental railway site north-west of Winton. Out of the corner of my eye I saw a small rock move about 100mm. But rocks don't move!

It took a couple of minutes for me to actually see a lizard among the rocks. One of the best examples of nature's art of camouflage I have ever seen. If the lizard hadn't moved, I wouldn't have seen it. I have attached a couple of pictures (above) that show how well they blend in with their environment, and how small they actually are.

MAL EARNSHAW, BEGA, NSW

WORTHY WINNER

I have enjoyed an AG membership for some years and always look forward to receiving my copy of the journal.

The article on the Leyland Brothers, *Life on the road* (AG153), brought back wonderful memories of their great TV shows and I am fairly sure that it was on their 1966 "west to east" trip that included photos of them on motorcycles going through the water at the base of Uluru with waterfalls in the background.

I have often wondered what happened to Mike and Mal and now I know and am glad that Mal still has his adventurous spirit but sad that Mike is not now with him or us.

Both these men deserved an Australian award if they haven't already got one.

TREVOR RICHARDS, SANDRINGHAM, VIC

ED: Hi, Trevor. We gave Mal the AGS Lifetime of Adventure award in 2019 – the Society's highest honour.

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Talkb@ck



In January, we highlighted the impact the recent extreme bushfires have had on Australia's insect populations. Here's what you had to say.

PIP MORRISSEY

So many of our native birds depend on insects as their main food source and breed when insects are plentiful...the flow-on effect of these fires is far-reaching.

MICHAEL RHODES

They may not be furry, cuddly or cute but are every bit as important in the great scheme of things.

JAMES PACKMAN

We regularly drive to Batemans Bay from Sydney... In summertime I need to put a bug screen on the front of the car. This summer? Not one noticeable bug splat. Nothing.

ANGELA BENNETT

Bugs are essential to our ecosystem – they play very important roles, pollinators, cultivators, composters – so we do need to worry about mass loss or extinction.

JULIE SKINNER

Insects we used to see as children seem to be few and far between in the last 20 years! My take is too much spraying of insecticides.

GEOBUZZ

MARCH–APRIL 2020

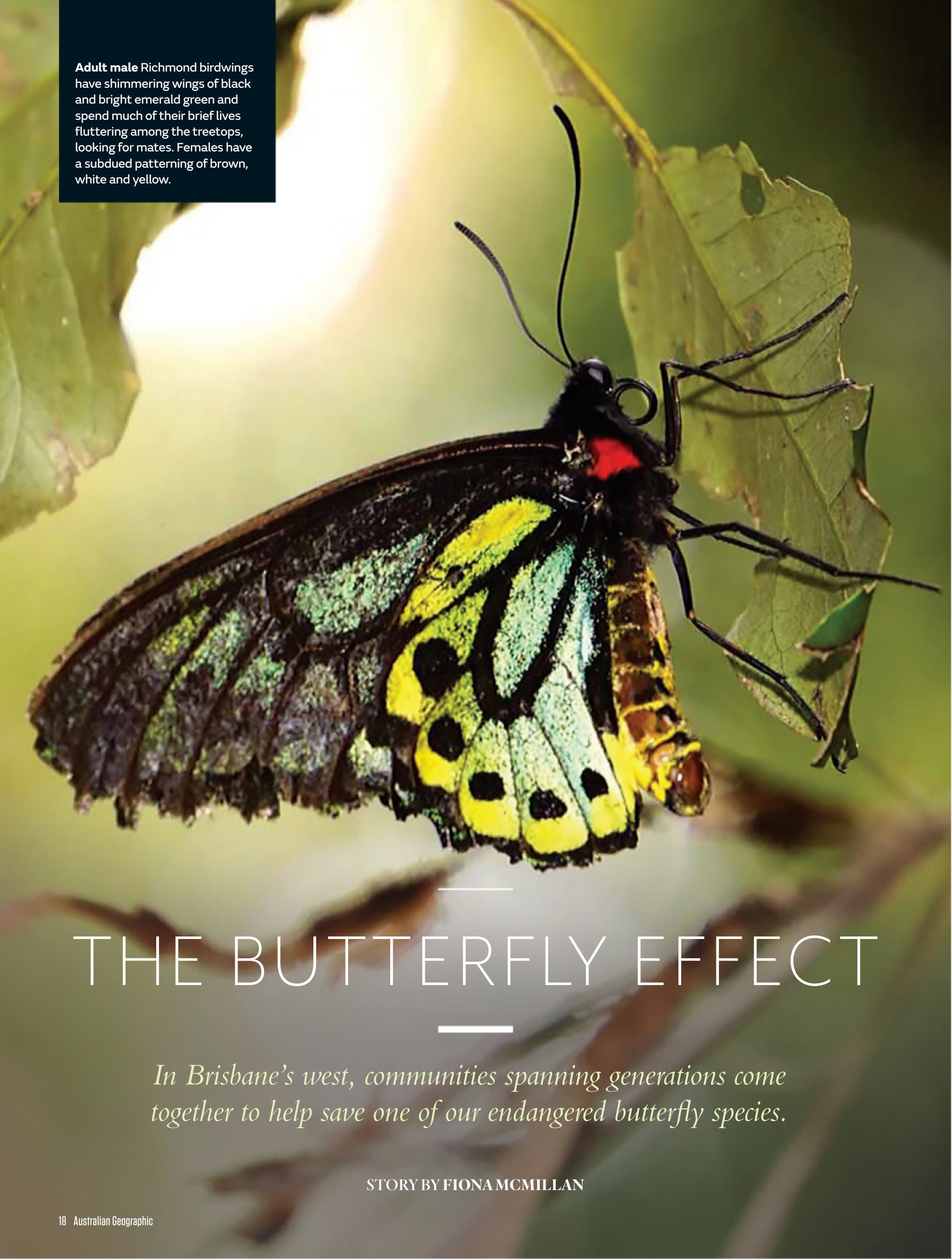
BIG PICTURE

CHARRED ISLE

By Quentin Chester

Sometimes referred to as Australia's Galapagos for its abundance of wildlife, Kangaroo Island (KI) was decimated by fire in January. On page 64, AG writer and KI resident Quentin Chester shares his story of the unfolding tragedy, what it means to him and how the small island community is responding.





Adult male Richmond birdwings have shimmering wings of black and bright emerald green and spend much of their brief lives fluttering among the treetops, looking for mates. Females have a subdued patterning of brown, white and yellow.

THE BUTTERFLY EFFECT

In Brisbane's west, communities spanning generations come together to help save one of our endangered butterfly species.

STORY BY FIONA MCMILLAN

“**W**E NEED MORE WATER!” cries out a member of the Girl Guides group as the last drops spill from her bucket. Her friend sets off to find more. Someone else calls, “Does anyone have the string?”

“Yes, over here!” comes the reply. “Remember, the vines are fragile, so be gentle.”

It’s a warm Sunday morning in bushland in Brisbane’s west, and these Girl Guides are working hard with the help of khaki-clad volunteers from Habitat Brisbane. We’re here because the local Kenmore Girl Guides have secured a mini-grant from the Roots & Shoots Program. Set up by famed conservationist Jane Goodall, it aims to support grass-roots and community environmental projects and these girls have decided they want to use their funds to help save the endangered Richmond birdwing butterfly.

These small grants are worth just a few hundred dollars each but, as this project proves, a little bit can go a long way in conservation, sparking a butterfly effect.

AUSTRALIA IS HOME to three birdwing butterfly species. The northern birdwing lives at the tip of far north Queensland; the Cairns birdwing has a range that stretches from Cooktown to just south of Mackay; and the Richmond birdwing lives between Hervey Bay, in south-eastern Queensland, and northern New South Wales.

These butterflies are called birdwings for good reason. Even the smallest species, the Richmond birdwing, has a wingspan of up to 16cm, similar to those of some small birds, including Australia’s weebills and spotted pardalotes.

Adult Richmond birdwings feed on the nectar of several native flowering plants, including bloodwood, lilly pilly, bottlebrush and native frangipani and also on non-native lantana, bougainvillea and honeysuckle. But their caterpillars eat only the leaves of two plant species – the native vines *Pararistolochia praevenosa* and *P. laheyana*. The latter is found only in limited mountain areas and so the butterfly’s survival largely depends on *P. praevenosa*, known appropriately as the Richmond birdwing vine. The butterflies are strong flyers and females will search up to 30km for the scent of the leaves of this vine, where she can lay her eggs. But a shortage of these vines lies behind a decline in the butterfly and that’s where these enthusiastic Girl Guides are now making a contribution.

As recently as the late 1800s, Richmond birdwings thrived in southern Queensland and northern NSW, says Dr Don Sands, a retired CSIRO scientist who’s been studying the species for decades. They were abundant along the



▲ **Don Sands’** extensive entomological experience and lifelong passion for conservation first gave the Richmond birdwing butterfly a chance at survival this century.

Brisbane River and in the hinterlands of the Sunshine and northern NSW coasts. But, by the early 1900s, the species’ population was crashing as rainforests and bushland were cleared for farmland and urban development, and the larvae lost their food plants. The birdwings’ habitat became increasingly fragmented and their plight was made worse by the spread of an invasive weed known as Dutchman’s pipe. The odour released by this vine confuses female birdwings, causing them to lay their eggs on its toxic leaves.

By the 1970s, when Don stepped in to help, things were looking grim for the Richmond birdwing. As a CSIRO scientist, he’d spent his career working on insect pests and weeds and played a pivotal role in the biological control of many horticultural and agricultural pests. It was important, interesting work that took him to Papua New Guinea. And that’s when birdwings first floated into his life. “New Guinea is alive with beautiful birdwing butterflies and I had them breeding in the garden in Port Moresby,” he says.

Returning to Australia several years later, he relocated to western Brisbane. By then, Richmond birdwings had almost disappeared completely but Don had developed a keen eye for spotting them and noticed the occasional visitor. One small colony remained near Brisbane, he recalls, but that land was cleared for development and the colony was wiped out. Fortunately, he’d begun planting Richmond birdwing vines on his own property. And slowly but surely the butterflies came.

Don then met NSW National Parks and Wildlife Service ranger Bob Moffatt who encouraged him to share vine seedlings with the community. They donated seedlings to Balunyah Nursery, part of the Kurrachee Aboriginal Co-operative in Coraki, NSW. Balunyah’s staff grew and tended the vines, and from these propagated more, and people started planting the vines in northern NSW. “And lo and behold,” Don explains, “the birdwings were starting to come in.” Next, Don became involved with CSIRO’s Double Helix Club, which connected scientists with schools. Get kids involved in conservation, he soon discovered, and things can take off.



◀ **Working in Brisbane bushland,** Fiona McMillan and daughter Ava plant a Richmond birdwing vine, the main foodplant for caterpillars of this butterfly species.

By the turn of the millennium, thousands of children had learnt how to plant and care for the vines. It went beyond schools to parents and councils. “And it came to the point where the community took this on,” Don says. He and fellow conservationists formed the Richmond Birdwing Recovery Network, which eventually came under the umbrella of the Wildlife Preservation Society of Queensland (WPSQ). Don has since changed the name to the Richmond Birdwing Conservation Network, which reflects how far its cause has come.

AND THAT’S WHERE the Kenmore Girl Guides, of which my daughter Ava is a member, enters this story. It’s a Friday night in their Guides hut and the application for the Roots & Shoots mini-grant has been successful, so tonight Matt Cecil from WPSQ is our guest. He points out where Richmond birdwing populations have been established in south-eastern Queensland and explains that it’s critical that colonies aren’t isolated, because that leads to inbreeding and severe genetic problems. For healthy butterflies, we want stepping stones that allow mingling.

He brings out a Richmond birdwing vine, of which the Girl Guides plan to buy many more with their grant and use them to establish stepping stones where needed. That’s where Cody Hochen comes in. Cody works with the Brisbane City Council Wildlife Conservation Partnerships Program, and maps Richmond birdwing vine populations. He has identified Pullenvale Forest Park, in Brisbane’s west, as an ideal spot, and summoned a small army to help us.

Habitat Brisbane is a volunteer program affiliated with the City Council and Lynn Brown coordinates its Pullenvale group. On hearing of the Girl Guides’ birdwing project, she’s marshalled members into action. Many are retirees with a shared love of conservation, who are often up early on weekends, restoring natural habitats. When we arrive on a Sunday morning in September, they’re waiting with plenty of water and all the tools we’ll need. Cody is there too, with mulch, soil and fertiliser.

The girls select a potted vine each, and we find the pre-marked planting spots, shaded by a high canopy of eucalypts where the ground slopes towards Pullen Pullen Creek. I watch my daughter crouch over a freshly planted vine. She ties string around a supporting reed, gently securing it to a narrow branch so the vine will have something to grow

“IT’S CRITICAL THAT COLONIES AREN’T ISOLATED.”

along. The forest is busy with people working in the dappled morning light. We span generations and with luck, care and rain, we will have established a new area of Richmond birdwing habitat. Abbie Mitchell, General Manager of the Roots & Shoots Program in Australia, is thrilled to learn that the project has brought people together in this way. “What starts as one child having an idea they’d like to be proactive about ends up having this lovely ripple effect in the community,” she says.

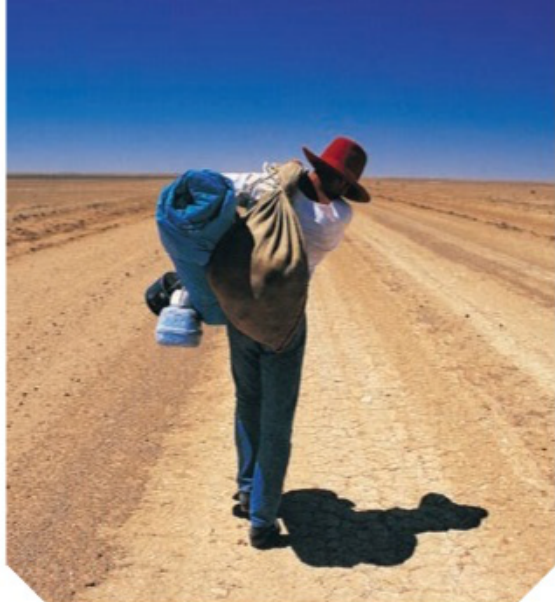
Indeed, that was Jane Goodall’s original thinking, Abbie explains. She began the program in Tanzania 29 years ago, when local children gathered on her front porch to talk of how they might change things for the better. Jane saw in them energy, determination and a great deal of hope. Here in Pullenvale Forest Park, members of Habitat Brisbane see it too. More than one remarks to me about how good it is to see a new generation involved in bushcare in this way.

Certainly, there is more work ahead. The vines’ biggest risk is the soil drying out, and we all comment on how dry recent conditions have been. Leaves crunch under our feet and tangles of exposed tree roots line the embankment of Pullen Pullen Creek, reaching for water that isn’t there.

“We’ve now got this terrible challenge of climate change,” Don says. “But that doesn’t mean we don’t do anything; it just means we’ve got to do things differently. If we plant tough, drought-resistant plants that the birdwing vines can grow into, it helps keep the humidity up and they have a better chance of surviving.”

The appropriate plants also keep moisture in the soil and that’s something the entire ecosystem depends on. Don is adamant: in ecology, it’s all about interactions. Community interactions are vital too, and Don is delighted to hear of the Girl Guides’ project. “I hope the whole thing is very successful,” he says.

AG



PORTRAIT OF AUSTRALIA

*Bribie Island Seaside Museum, Queensland
28 February–24 May*

SHOWCASING STUNNING photos from AUSTRALIAN GEOGRAPHIC'S acclaimed 30-year anniversary book *A Portrait of Australia*, this travelling exhibition will be at Queensland's Bribie Island early this year. Celebrating the bush, outback and coast and the people who live there, the exhibition takes you to some of the most rugged and remote parts of the country to tell remarkable stories of ordinary Australians. It was developed by the National Museum of Australia with AG. For venues: nma.gov.au/exhibitions/portrait-of-australia

Presenting Partner



OCEAN FILM FESTIVAL

*Various locations
and dates across Australia
March–April*

THIS CAREFULLY curated short film selection of the Ocean Film Festival World Tour documents the ocean's power and beauty and celebrates all – from surfers to oceanographers – who revel in its mysteries. Making a splash in 29 locations nationwide, it invites Aussie audiences to immerse themselves in the wonders of the ocean without getting wet. For tickets: oceanfilmfestival.com.au



BIRD NERD with Peter Rowland FIRE: FRIEND AND FOE

AUSTRALIA HAS experienced bushfires for more than 60 million years.

Fire is an integral part of Australia's biodiversity and certain plants, such as banksias, are even dependent on it for the release and germination of their seeds. Many eucalypts and wattles have considerable resistance to fires, and birds are dependent on the resilience of such plants for food, shelter and nesting sites.

However, while low-intensity fires and some fire regimes are beneficial, the increased frequency and intensity of bushfires in recent decades has been devastating. This season, of course, the impact of such fires has been the most extreme and widespread seen so far.

But indiscriminate, unplanned or poorly managed fires, or the exclusion of fire from an area altogether, can also be very damaging. Indeed, inappropriate fire management is the second biggest threat to birds after habitat clearance and fragmentation.

Australia is one of 17 megadiverse countries, which together contain about 70 per cent of the Earth's biodiversity. The majority of Australia's 15 national biodiversity hotspots are located in the south-east and south-west, and it is these areas that are being most severely impacted by frequent and intense bushfires. And the bird species in these areas are at particular risk.

The largely ground-dwelling eastern bristlebird, one of three bristlebird species unique to Australia, is one of these. This endangered species inhabits dense, predominantly coastal, vegetation, where it feeds on insects.

You're most likely to see it running through clearings or across walking trails. Its plumage is dull brown above, with reddish wings, and pale grey on its underside, becoming more whitish on the throat.

Populations of eastern bristlebird are found in three disjunct areas of eastern Australia. The northern population has suffered huge decline in recent years, with fewer than 40 individuals now left in the wild. There are concerns that the recent fires in south-eastern Queensland and north-eastern New South Wales have destroyed this population even further. Studies show that numbers decline when intense fire destroys cover, but birds can quickly recolonise after patchy fires. Conversely, without fire the vegetation becomes too dense for them to inhabit.

Australia's critically endangered orange-bellied parrot also benefits from low-intensity fires in its Tasmanian breeding areas, with the optimum fire frequency being one to eight years. The season in which the fires occur, the frequency and intensity of fires, and the amount and timing of follow-up rainfall can all affect outcomes.

Other species, such as the black kite and brown falcon, benefit from fire in a different way. Flocks gather around bushfires to feed on insects and small animals that flee the flames, and these birds are known to spread fire by picking up burning sticks and dropping them in new areas in an effort to flush out more prey.



The brown falcon
can use fire to
its advantage.

FOLLOW Peter on Twitter:
[@_peterrowland](https://twitter.com/_peterrowland)
and Instagram: [_peterrowland](https://www.instagram.com/_peterrowland)



WITH ITS WHITE timber shed shimmering against blue skies and rainforest-clad hills, the old sugar wharf on Dickson Inlet in Port Douglas is an eye-catching sight for tourists returning to the town's sleek, modern marina each afternoon after excursions to the Great Barrier Reef.

Port Douglas, in far north Queensland, was established in 1877 after gold was discovered nearby. The town grew rapidly as a port and administrative centre and by 1880 boasted 14 hotels. But the boom was short-lived and Cairns became the regional hub after it was selected as the terminus for a new railway line in 1886. Port Douglas continued as a port for the burgeoning sugar industry centred around Mossman, 21km to the north, and in 1904 £3000 was allocated for the construction of a public cargo wharf near the mouth of a creek on Dickson Inlet. Completed in 1905, it was 14 x 32m, set well out into the main channel and reached by a stone causeway and wooden trestle along which ran a railway track.

It was extended in 1924 and its storage shed repositioned along the eastern edge and lined to hold bagged sugar. All sugar trade ceased in 1958 due to the advent of bigger cargo ships, which were unsuited to Port Douglas's shallow channels.

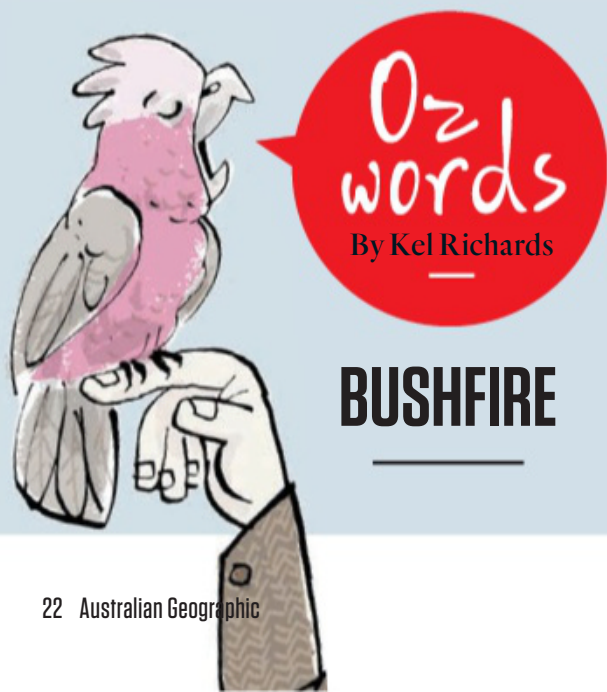


◀ Bulk sugar was loaded onto lighters at Port Douglas and taken to Cairns where it was transferred onto bigger international cargo vessels for export, as depicted in this scene from the late 1940s.

The wharf briefly functioned as a seafood restaurant between 1968 and 1972, and in 1977 the location was earmarked for redevelopment that included land reclamation works. On the wharf's eastern side these works led to demolition of the timber trestle and covering up of the stone causeway with dredge spoil. In 1979 renowned underwater photographer Ben Cropp took out a 20-year lease on the building and ran it as a shipwreck museum. Among artifacts displayed, there was ballast from Cook's *Endeavour* (see page 84) and cannon balls from Flinders' *Investigator*. The shed was also modified to include living quarters for Cropp and his wife.

The wharf was heritage listed by the National Trust in 1983 and by the Queensland Heritage Register in 1992. After Cropp's lease ran out, the local council carried out restorations, and today the sugar wharf is an event venue popular with wedding parties using the nearby St Mary's By the Sea chapel, which was moved to its current position in 1988.

PHOTO CREDITS, FROM TOP: CHRISSIE GOLDRICK; DOUGLAS SHIRE HISTORICAL SOCIETY INC.



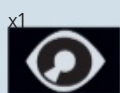
GIVEN THE dramatic bushfire season we've been having, now seems the right time to look at this distinctively Australian word. And it is distinctive. What we call a *bushfire* is called a "wildfire" everywhere else in the world. The name we've adopted comes from the Aussie habit of constructing expressions using the word "bush" or tacking on other words to "bush" (as in a "bush so-and-so"). There was a phenomenal explosion of

"bush" words that now fills no fewer than 36 pages of the second edition of the *Australian National Dictionary*. As for *bushfire* itself, this was first recorded in 1832. It turns up in the *Sydney Monitor* that year, the following year in the *Perth Gazette*, in 1841 in the *Launceston Courier*, and so on through the decades and around the country. It seems poet Dorothea Mackellar could have added "land of *bushfires*" to her "land of droughts and flooding rains".



LOOKING UP

with Glenn Dawes



Naked eye

Autumn evenings display the glorious southern Milky Way. If suburban skies rob your view of our galactic glow, its position can easily be determined. Start with the pointers and the Southern Cross. Move westward to the False Cross then on to the brilliant stars of Canopus followed by Sirius.



Binoculars

Within one field south of the False Cross in Carina lies the brilliant open-star cluster NGC 2516. Within the obvious round haze are a number of brighter stars, clearly visible, that form curved lines, with a red-coloured star offset from the centre.



Small telescope

The constellation of Musca is best known for two globular clusters, both within one degree of bright stars. These 'cities of stars' are quite different. Large NGC 4372 (near Gamma Muscae) has an even-surface brightness while NGC 4833 (near Delta) distinctly brightens towards its centre.

Glenn Dawes is a co-author of the yearbook *Astronomy 2020 Australia* (Quasar Publishing).

quasarastronomy.com.au



NEED TO KNOW with Dr Karl Kruszelnicki

EASTER'S TIMING

MOST OF US think of Easter as something to do with chocolate Easter eggs. But after a few years of celebrating Easter we begin to realise that, unlike Christmas or Anzac Day, it doesn't happen on the same date each year. In fact, Easter can happen anytime between 22 March and 25 April. Fortunately, there's a simple thousand-year-old formula to work it out.

Back in 725 AD, the Benedictine monk St Bede, or The Venerable Bede, defined Easter Sunday as: "The Sunday following the full Moon which falls on, or after, the equinox..."

Let's work backwards – equinox, full Moon, Sunday – and start with the equinox. Its Latin roots are *equi* meaning "equal", and *nox* meaning "night". And it describes when there are equal hours of daylight and night-time. (They're not exactly equal but I'll explain that another time.)

Astronomers, however, define the equinox as being when the line between day and night crosses both the North and South poles simultaneously. There are two equinoxes each year – in late March and late September.

To work out Easter, first we wait for the March equinox. Then we wait for the next full Moon, which can take anything between one and 28 days. Finally, we wait for the next Sunday, which can be any time from one to seven days away. And that's Easter Sunday.

But that simple definition can get messy when religion takes precedence over science, as it did last year, for example.

In the March equinox of 2019, the line between day and night crossed the North and South poles simultaneously at 9.58pm Universal Time on Wednesday 20 March.

The full Moon occurred about four hours later, at 1.43am Universal Time,

spring equinox
(21 March)



autumn equinox
(23 September)

Thursday 21 March. The very next Sunday 24 March, should have been Easter Sunday. But it wasn't. Easter Sunday in 2019 was 21 April!

Huh?

Astronomers have determined that the equinox can happen on 19, 20 or 21 March. But religious leaders says it occurs only on 21 March.

The next full Moon after 21 March was 19 April. The next Sunday was 21 April – Easter Sunday.

No wonder the supermarkets hedge their bets by stocking chocolate bunnies from February.

DR KARL is a prolific broadcaster, author and Julius Sumner Miller fellow in the School of Physics at the University of Sydney. His latest book, *Dr Karl's Random Road Trip Through Science*, comes with augmented reality features and is published by HarperCollinsPublishers Australia. Follow him on Twitter at @DoctorKarl

FRONT PAGE HURLEY

This pioneering photographer showed the same gutsy determination to nail the perfect shot as her famous dad before her.



Adelie, seen here (below) in a darkroom processing her images, had a reputation for tenacity and resourcefulness. “Being a press photographer suits my personality,” she said. “I’ll go anywhere, anytime.”



IN AUGUST 1948 the cover of Sydney’s pictorial magazine *PIX* featured a stylish young woman wearing an elegant suit and holding a Speed Graphic camera, as if she was a film star playing a ‘girl photographer’ (above). The girl in the picture, Adelie Hurley, however, was the real deal. Arguably Australia’s first female press photographer, colleagues called her ‘Front Page Hurley’ because her work regularly appeared on the front pages of Sydney’s newspapers.

This wasn’t the first time Adelie (1919–2010) had appeared on the cover of *PIX*. As a model she’d already made several appearances in the magazine, but this was the first that celebrated her life behind the camera.

Recently returned from San Francisco where she’d been living since 1945, Adelie was photographed for the feature in action on Sydney’s streets. Carrying her unwieldy camera, she is striding through the city with her customary élan, climbing ladders, perching on building precipices and charming her subjects, all with hair in place, lipstick on and in a straight skirt and heels.

Although she usually swapped the skirt for slacks when working, Adelie was always chic. The daughter of Antoinette Hurley and acclaimed Antarctic and war photographer Frank Hurley, Adelie was born in Sydney in 1919, and often said she’d been named after the penguins her father had photographed in the Antarctic. As children, she and her twin sister, Toni, and their siblings had helped their father with his work. But it wasn’t until she picked up a friend’s Graflex camera at the age of 17 and looked through the viewfinder that she thought “this is for me”.

Her first story, about a friend living on Goat Island, appeared in *PIX* in 1941. More stories followed. Although none of the papers would put her on staff (allegedly due

to their lack of women’s toilets), she was soon employed regularly as a freelance photographer.

In 1942 Adelie made her way to Darwin, stowing away in a military convoy, and took photos for the *Daily Telegraph* of Australian soldiers and the city after the first bombs fell. Living in the USA, she sent back stories about racy San Francisco nightclubs, and the lives of Australian war brides. Back working on Sydney’s daily papers, Adelie photographed everything from fashion shows to murder scenes.

Despite resistance from some male colleagues, who would sabotage her cameras, she was known for her resourcefulness and determination as well as her technical proficiency. She continued to get work, she said, “simply because I nearly always get my picture”.

In 1954 she joined the staff of *The Australian Women’s Weekly* and shot stories in India, Fiji and Russia just after the Cold War began. She visited many remote parts of Australia and the beautiful photographs of the country’s landscape that she sent into homes on the glossy pages of the magazine sparked a desire in many to explore the country for themselves.

It wasn’t until the 1970s that any women were employed full-time as photographers in Australian newsrooms, by which time Adelie was travelling the country in a converted, self-contained bus (with wall-to-wall carpet and a cocktail cabinet), selling her photographs to magazines and publishers. She retired in the 1980s to Coffs Harbour with Toni where the pair continued to make a glamorous splash as ‘Las Presidentas’ of the region.

LINDA BRAINWOOD

Linda is a picture researcher and the editor of the Dictionary of Sydney website at the State Library of NSW.



High heels never kept Adelie from getting into position to take the best shot. "I nearly always get my picture," she said about her success in the male-dominated area of press photography.

★ SPACE

MAKING SATURN
LOOK ORDINARY

This artist's impression shows the extrasolar ring system circling J1407b. The rings eclipse the young Sun-like star J1407, as they would have when the exoplanet was first detected in early 2007.

THE REMARKABLE object I bring you today was discovered some years ago, but has recently been in the headlines again. J1407b is an exoplanet – a planet orbiting a star outside our solar system. In this case it's orbiting a Sun-like star 430 light-years away that is part of a bigger group of adolescent stars.

J1407b was detected by the dimming of the light of its parent star as it passes in front of it. This is a well-established discovery technique known as the transit method. Like most exoplanets, it's too far away to be seen directly, but the transit method is a powerful way of investigating such distant objects. And, in J1407b's case, it's revealed much more.

Back in 2007, astronomers recorded a long and deep dimming of the parent star displaying complex structure – short-term changes in the star's brightness caused by differing amounts of obscuration passing in front of it. These were interpreted as being due to a system of rings around the planet, but the big surprise was the size of J1407b's ring system.

Analysis shows that it must have a diameter of about 120 million kilometres, which is 80 per cent of

the distance from the Earth to the Sun. If these rings were around Saturn in our own Solar System, they would be easily visible to the unaided eye.

The rings of Saturn are thought to have been formed when two icy moons collided, producing myriad ice particles that today make up the rings. But J1407b's rings are probably debris left over from the formation of the planet itself, which may also have accumulated to form one or more moons.

And that's what has brought J1407b back into the news, with researchers investigating whether a large gap in the rings could be explained by the presence of a moon orbiting outside them. Sadly, the new work shows that is not possible.

Something else must be at play – perhaps an infant moon embedded in the rings. We'll have to wait until the next time J1407b passes in front of its parent star, which is expected in the next few years, to discover more.



FRED WATSON
is Australia's
Astronomer-at-Large.

— DOWNLOAD —

GEOCACHING

Download the Geocaching app to join the world's largest treasure-hunting community. Use the app on a GPS-capable device to locate hidden containers called geocaches. Once you find one, sign the guestbook, place the container back how you found it and share your experience with the online geocaching community. Some boxes include trinkets such as small toys that can be swapped for something of similar value. Millions of geocaches are hidden across Earth, in most countries.



— READ —

GET GROWING

AUSTRALIAN GEOGRAPHIC, \$29.95

This new book puts the fun into gardening for all the family. Bright illustrations and text take readers in steps to successful gardening. And simple ideas backed by expert advice inspire anyone to garden. The science behind successful growing is illustrated through experiments, showing what plants need to grow and their place beyond your own backyard. **Available at:**

australiangeographic.com.au/shop



— READ —

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A great walk can be an exhilarating experience that remains with you forever. Perhaps you're stirred by endless mountain views or soothed by stepping into a living green cathedral. Maybe the physical challenge drives you

harder and farther than you thought possible. Australia has many extraordinary walks; this is AG's collection of the best to be found in every corner of the country. **Available at:** australiangeographic.com.au/shop





SMITH DOES IT AGAIN!

Former AG Adventurer of the Year and solo aviator

Michael Smith re-creates the world's first trans-global flight.

AT 3.45PM ON 10 December last year, exactly 100 years to the day after Ross and Keith Smith and their crew aboard the Vickers Vimy G-EAOU (see AG 153) landed at Darwin after completing the world's first long-haul flight, I touched down at the same place aboard *Southern Sun* (pictured) completing my own re-enactment of their historic journey.

I was able to retrace their route and land in nearly all of the same countries, only avoiding Syria, Iraq and Iran. England, France, Italy, Greece, Egypt, Israel, Bahrain, Pakistan, India, Myanmar, Singapore, Indonesia and Timor Leste were all visited and I was curious to see how flying, and the world, has changed over that century.

Piloting a small aircraft still has many challenges – I was delayed and faced difficult flying conditions in similar places to the Vimy, with France, Italy and crossing the equator posing the toughest challenges. I read in Ross Smith's book, *Flight to Fame*, how difficult those setbacks were for him and his crew, and I experienced the same fears. But aircraft are now far more reliable. The Smiths were joined by two talented engineers, Jim Bennett and Wally Shiers, who all but rebuilt the engines every three days. My modern engines purred like a pair of contented kittens and sipped a tiny amount of fuel, less than a four-wheel-drive does on a freeway!

The Smiths navigated with an atlas, compass and watch. I relied on GPS, except when I approached an area in the Middle East where all three GPS devices in the plane went blank. I reverted to my magnetic compass and hand-wound Russian clock in my dash to enter the country.

The Vimy often sank in the mud of makeshift runways, whereas I found myself bogged down in the convoluted flight approval processes of various nations. What hadn't changed was the generosity of strangers. Ross wrote with wonder at the friendliness and helpfulness of people along the route. Similarly today, in every stopover there was someone going out of their way to be helpful or kind, proud of their home and willing to assist an adventurer on a long journey.

MICHAEL SMITH



On my arrival in Darwin
I hand over a bag of commemorative mail postmarked for delivery by Australia Post.

southernsun.voyage @southernsunjourney

Cook: 250 years



By Virtue of This Act I hereby Take Possession of This Land,
by artist Brian Robinson from the NMA's new exhibition.

AS AUSTRALIA PREPARES to mark 250 years since Cook and HMB *Endeavour* arrived in Botany Bay in April 1770, it's important to look at this historic moment from fresh perspectives while also acknowledging the achievements of the man and his remarkable voyage of discovery. The arrival of Cook lies at the very core of Australia's history as a modern nation and this year there are many activities and exhibitions that will attempt to

shed new light on the event and examine its impact on the Indigenous people who witnessed *Endeavour* making its way up the continent's east coast. Visit the National Museum of Australia's exhibition **Endeavour Voyage – The Untold Stories of Cook and the First Australians** in Canberra, 8 April–11 October. Free entry.
More info: nma.gov.au/exhibitions/endeavour-voyage-untold-stories-cook-first-australians

AUSSIE TOWNS

JERICO, QLD

With a name that invokes a famous event in the bible, this tiny outback town could be en route to the Promised Land.



Jericho is on the Capricorn Highway, 224km west of Emerald, 191km east of Longreach and 1054km, via Toowoomba and Emerald, from Brisbane.

JERICO IS A tiny rural service centre on the Capricorn Highway, midway between the outback towns of Emerald and Longreach. This region of Central Western Queensland is predominantly cattle country. Today, Jericho's primary function is to service the surrounding large landholdings and entertain passing travellers with its remarkable ability to exploit its tenuous biblical connections, the most notable example being its Crystal Trumpeters display in the main street, which symbolises various moments in the Old Testament. These include the parting of the Red Sea, receiving the Ten Commandments, crossing the River Jordan and arriving in the Promised Land.

VISITOR INFORMATION

Jericho doesn't have its own visitor centre, so try the Barcaldine Tourist Information Centre, 149 Oak Street, Barcaldine, about an hour's drive to the west; open daily 8.15am–4.30pm. Call 07 4651 1724.

outbackqueensland.com.au/town/jericho



ORIGIN OF NAME

The local Jordan River was named after an early European settler, Harry Jordan. It was a small step to apply a biblical reference and name the settlement on its banks Jericho.

Places of interest



1 CRYSTAL TRUMPETERS

In 1988, as a Bicentennial Project, the town constructed the Crystal Trumpeters to recall the biblical story in which the Israelites marched around the Palestinian city of Jericho before blowing their trumpets to collapse the fortifying walls. A sign on the monument, on the Capricorn Highway across the road from the Town Hall, explains that: "Because Jericho, Queensland, is built on the Jordan River south of the Lake Galilee, we decided to tell the story of the original Jericho (Joshua 6). The Israelites came. They marched once a day for six days and seven times the next day. Then they blew their trumpets and made a lot of noise so the walls would fall down and they could enter (Joshua 18–22). To understand why a bunch of desert nomads expected these tactics to work against a fortified city we have to go back 40 years before it happened. This is told in the outer circle of rocks (Exodus–Joshua)."

2 JERICHO DRIVE-IN THEATRE

Located on Darwin Street, and beautifully preserved with pleasant lawns and an impressive modern all-weather screen, is the Jericho Drive-In Theatre, where movies are still regularly screened. It opened in 1969, only has a capacity for 34 cars, has 34 seats for those who don't want to sit in their cars, and operates on the third Saturday of every month. It's recognised as the smallest drive-in picture theatre in Australia.

For details: 07 4651 4129.

3 THE PALACE

Located about 60km south of Jericho, The Palace is the largest-known complex of Indigenous art in central Queensland, featuring etchings and drawings on the sandstone cliff faces of a gorge about 600m long and 200m wide. Anthropologists



have recorded more than 9471 figures in the area ranging from stencils of hands, feet, boomerangs and axes as well as drawings of spears, clubs, shields, snakes and lizards. There are a large number of abstract patterns as well. Located on private property between Jericho and Tambo, south-east of Longreach, the site is now closed to the public.



4 PAVING THE GLORY

Along the southern side of Darwin Street is a series of pavers commemorating "the centenary of Anzac".

The project was completed in 2014–15 by school students in the Barcaldine Regional Council area. The sentences etched into the pavers are local children's thoughts about what the Anzac legend means to them.

5 TOWN MURAL

A mural with a charming sense of outback fun, painted on the side of a corrugated iron shed in Darwin Street, is worth seeing. It shows three goannas having a beer and leaning over a fence. Very outback and very Australian.



JERICHO TIMELINE

- The area around Jericho is the homeland of the Bidjara people.
- The first Europeans here were a party led by explorer Major Thomas Mitchell in **1846**.
- By the **1850s** settlers had reached the area.
- In **1914** the local Jericho Shire was formed.
- A branch railway line from Jericho to Blackall was built in **1908**.



- In **1933** The Palace Aboriginal site, sometimes also known as Black's Palace, located 60km south of Jericho, was declared a Scientific and Recreational Reserve.
- In **1950** the town was hit by a devastating flood.
- In **1969** the Jericho Drive-In Theatre was opened.
- In **1970** The Palace was gazetted as a permanent Aboriginal site.
- By **1971** the owner of Marston Station was appointed as the honorary warden of The Palace site.
- In **1989** The Palace came under the control of the then federal Department of Environment and Heritage. The site is no longer open for public inspection.
- In **2008** Jericho became part of the Barcaldine Regional Council.

Since 1988 Bruce Elder has travelled to every town in Australia. He has written more than 10 travel books including the Globetrotter Guides to Australia, Sydney and Queensland; *1015 Things to See and Do in Australia*; and *Explore Queensland* and *Explore NSW*. He worked as a full-time travel writer with *The Sydney Morning Herald* and *The Age* from 1996 to 2012. aussietowns.com.au

FIRST ANZAC DAY

ON 25 APRIL 1915, 16,000 Australian and New Zealand Army Corps (ANZAC) soldiers landed at what's now called Anzac Cove, on Turkey's Gallipoli peninsula. About 2000 were killed or wounded on that day alone. Weeks later, Australian newspapers published a flattering account of the landing by British war correspondent Ellis Ashmead-Bartlett and our soldiers' deeds at Gallipoli came to be seen as a rite of passage for our fledgling country. That view was fostered by Charles Bean, Australia's war correspondent and later official historian, and continues today.

During 1914, various organisations had formed in Australia to raise funds for our troops and European civilians affected by the war. In mid-1915 many of them began holding fundraising days that combined patriotic displays with carnivals. The South Australian government turned Labour Day, an October public holiday characterised by pageantry and celebration, into one and organisers called it Anzac Day.

By that year's end all allied forces had been evacuated from Gallipoli and it was clear the campaign had failed. But the final death toll was huge – 8709 Australians, 2779 New Zealanders, tens of thousands of British and French troops and even more Turks – and many Australians felt the landing had been of enormous national significance and needed marking. Anzac Day organising committees formed spontaneously in each state.

The federal government recognised Gallipoli's symbolic significance and hoped also that commemorating the campaign might reverse declining enlistments. In 1916 the acting prime minister and minister for defence, George Pearce, officially named 25 April as Anzac Day. All states marked it with a commemorative service and a march of new enlistees and Gallipoli veterans. In many towns, lunch was provided for veterans and most states held afternoon or evening festivities.

In Queensland, however, Anzac Day 1916 was organised by the Anzac Day Commemoration Committee, ensuring the day revolved entirely around commemoration. It forbade fundraising because that would involve a festive element deemed inappropriate. In contrast, Victorian organisers focused on fundraising through pageantry and celebration. In New South Wales, opinion was divided.



Spectators lined Brisbane streets to watch the procession of the 41st Battalion, on the first Anzac Day in 1916.

Sydney's Lord Mayor, for example, was criticised by families of the dead for spending £1000 on decorative lighting for public buildings. And yet many returned servicemen urged the state government to make the day festive, reflecting what they thought fallen comrades would have wanted.

In London that year about 2000 sombre Anzacs marched through the streets, cheered on by enthusiastic Britons, before attending a commemorative service at Westminster Abbey. Troops stationed in Egypt held services for fallen comrades. Brigadier (later General Sir) John Monash explained in a letter to his wife that after the service in the morning troops took part in cricket, other games and "a great aquatic carnival".

Anzac Day has been observed every year since and by the 1920s ceremonies were held throughout Australia. In 1927, for the first time, every state observed a formal public Anzac Day holiday. And by the mid-1930s all the now-associated rituals – from dawn vigils to street marches and wreath-laying ceremonies – were part of Anzac Day culture. Most of these were devised and disseminated by canon David Garland, a military chaplain and the energetic secretary of Queensland's Anzac Day Commemoration Committee, who sought to make services ecumenical and accessible to all Australians.

Later, Anzac Day also served to commemorate Australians who died in World War II and all subsequent military and peacekeeping operations in which our nation has been involved. From the 1960s to the 1980s Anzac Day's popularity diminished, partly because fewer people seemed to think armed conflict was worth commemorating.

Since the 1980s commemorative activities at Gallipoli itself have become common. In 1990, to mark the campaign's 75th anniversary, prime minister Bob Hawke went to Gallipoli for Anzac Day, accompanied by a group of aged veterans of the conflict, the first prime minister to do so. Anzac Day has now regained much of its original status, with many seeing it as a way to honour the memory of our fallen soldiers.



EVENT

ANZAC DAY NATIONAL CEREMONY

25 April
*Australian War Memorial,
Canberra, ACT*

AS PART OF nationwide commemorations, the Australian War Memorial will host the national ceremony, beginning at 10.30am. It will follow the traditional order of service, including the veterans' march coordinated by the ACT branch of the Returned and Services League of Australia and will be broadcast live on the Memorial's Facebook page and YouTube channel. **For more info:** email ceremony@awm.gov.au For commemorative events near you, check with your local council.

EVENT

AG PRESENTS

18 March, *Ocean Lovers
Festival, Bondi, NSW*

THIS FIRST of the AG Presents talks for 2020 will feature courageous, inspirational advocates for the sea. Hear from multi-award winning underwater filmmaker Valerie Taylor, as she inspires with tales of her adventures. Relive a wild journey with AG's 2019 Adventurer of the Year, Michelle Lee – the first Australian woman to row solo across the Atlantic Ocean – and much more. **Info:** oceanloversfestival.com

EVENT

EARTH HOUR

28 March, *nationwide,
8.30pm local time*

NOW WORLDWIDE, this event that began in Australia in 2007 asks individuals and businesses to reduce global energy use by shutting down non-essential electric lighting for 60 minutes each year. Will you accept the challenge?



TIM THE YOWIE MAN

THE CASE OF THE ROARING BUNYIP

MENTION THE New South Wales Southern Highlands and most people think of rolling hills, Devonshire teas and stores peddling antiques. But a large number of historical reports suggest that the quaint highlands' village of Burrawang, 140km south-west of Sydney, should also conjure thoughts of bunyips.

In the valley below is a large swamp that's home to many unusual life forms including the rare giant dragonfly, part of an ancient group of insect fliers common during the age of the dinosaurs. Also supposedly lurking in the swamp's murky depths is the Burrawang Bunyip, a mythical creature whose roar, according to multiple anecdotes, has sent shivers up many local spines. Unlike most bunyips, which have roots in Dreaming stories, this Burrawang specimen is a more modern marvel.

During the early 1930s a group of railway workers fled in horror after hearing strange noises they believed to be a bunyip, coming from the swamp. Maybe they wanted an excuse for having the next day off, or had spent too long at the pub earlier in the night.

The Burrawang Bunyip was at its most ferocious during the 1960s when its "bull-like roar" was often heard echoing around the swamp. "The roar was so loud it shook the bottles off the top shelf of the bar," recalls Ed Woolfrey, former publican at Burrawang's pub.

But, somewhat tellingly, the bunyip hasn't been heard since part of the swamp was dammed in 1974, giving rise to theories that the infamous bellow actually came from the swamp's peat. (The swamp is one of the best examples in mainland Australia of montane peatland, which expands and contracts with changing temperatures.)

So much for what a bunyip supposedly sounds like. What does it look like? Ask 10 people and you'll get 10 different descriptions. Most accounts describe it as being like a feathered seal with legs. Other anecdotes are

even more outlandish, portraying it as an amphibious flying creature, sporting a long cyclops-like horn. Really!

In 1847 a 'bunyip skull' was exhibited at the Sydney Museum, now the Australian Museum. Prominent naturalist William Macleay examined the odd-looking relic and compared it with an even stranger one with only one eye socket. He concluded that rather than being a new species, both skulls were freaks of nature – one was a deformed camel and the other a deformed foal.

Whatever its origins, the bunyip has become part of our European folklore and features in many classic Australian children's books such as *The Bunyip of Berkeley's Creek*, by Jenny Wagner and Ron Brooks (Picture Puffin, 1978) and Michael Salmon's *The Monster That Ate Canberra* (Halstead Press, 1972).

In 1994 Australia Post issued The Bunyip Set Fine Mint stamps. And in 2001 the National Library of Australia chronicled sightings of the bunyip in a travelling exhibition. But if you want to experience a bunyip at its bellowing best, head for Murray Bridge in South Australia. There, if you drop some coins in a slot, a mechanical bunyip will emerge from a concrete cave and roar.

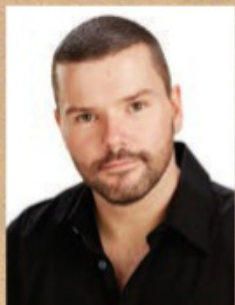
Whether its call is as loud as its Burrawang cousin, we'll never know.



To read about Tim's recent travels in western NSW see page 72. As a naturalist, author, broadcaster and tour guide, Tim has dedicated the past 25 years to documenting Australia's unusual natural phenomena. He's written several books, including *Haunted and Mysterious Australia* (New Holland, 2018). Follow him on Facebook and Twitter: @TimYowie

HOW CLIMATE CHANGE IGNITED A MONSTER

Record-breaking heat and drought in 2019 set up the perfect storm for bushfires to explode across eastern Australia, but major weather systems also played their part.



AS WE WENT to press, bushfires had ripped across a huge area of the country's south-east, making it our worst-ever summer bushfire season. It was exceptional also for razing large parts of typically moist northern New South Wales and many Australian habitats that rarely experience fire and have little tolerance for it, such as rainforests, tall wet eucalypt forests, swamps and marshes. What link did climate change have to the scale and severity of this season's fires?

The short answer is that, according to Australian Bureau of Meteorology data released in January, 2019 was both the hottest and driest year this country has experienced in 120 years of records (see p44). Rainfall was 40 per cent lower than average and many environments were tinder-dry after three consecutive years of drought. Most of the south-east was kindling waiting to be ignited – via lighting strike or, to a lesser extent, deliberately or accidentally by people.

For a more nuanced explanation, we have to look to climate patterns. One weather system called the Indian Ocean Dipole leads to moisture being drawn away from Australia when it is in a positive phase, as we experienced particularly strongly in 2019. Positive phases – when the eastern part of the Indian Ocean off northern Western Australia is cooler than the western part of the ocean – are becoming increasingly common with climate change.

The El Niño–Southern Oscillation is another driver of our country's climate. So called El Niño conditions occur when warming in the eastern tropical Pacific Ocean reduces the trade winds carrying rain towards Australia. This can make things significantly drier in eastern Australia and occurs about every eight years.

What is particularly worrying is that 2019's record drought wasn't experienced during an El Niño year, which many previous years with bad droughts and bushfires have been. This hints that in future conditions could get even drier.

Another reason the fires were able to spread so far this year and cause so much damage was because warmer conditions, caused by climate change, are allowing the bushfire season to begin earlier each spring and linger longer into autumn. In 2019, for the first time, fire seasons overlapped in Northern Hemisphere California and Southern Hemisphere Australia. That could mean Australia may no longer be able to rely on vital firefighting resources, such as aeroplanes, shared with the USA.

Published in January, a review of 57 studies by academics at the UK's Met Office and several British universities,

showed fire seasons have been lengthening in many parts of the world, including Australia, since 1979, resulting in an increase in duration of about 20 per cent. In south-eastern Australia the bushfire season usually peaks about January, but catastrophic fires had already started in south-eastern Queensland and northern NSW by September in 2019.

The review by UK scientists also confirmed a link between climate change and an increase in severity and frequency of fire weather. This usually means a combination of high temperatures, low humidity and rainfall, and high winds. In fact, there was another weather system at play this year – the Southern Annular Mode. This caused strong winds to blow from the west across the continent, carrying hot air from Central Australia to fan the flames.

The environmental damage to Australia has been staggering this season, and the scale of animals, plants and habitats wiped out likely makes this our single biggest ecological disaster. Frighteningly, the scale of what we witnessed was not predicted to happen until global temperatures had risen further. Many imagined a bushfire crisis such as this to be a theoretical worst-case scenario likely to still be decades away.

But now is not the time to despair. It's time to push for action. We *can* prevent this or worse from becoming the new normal. Action to limit greenhouse gases and mitigate catastrophic climate change isn't that hard. We just need leaders with the political will to get on with it, and do so fast. For now all I can hope is that by the time you read this, drought-stricken regions have been drenched with long sought-after rains.

JOHN PICKRELL

is a former editor of

AUSTRALIAN GEOGRAPHIC.

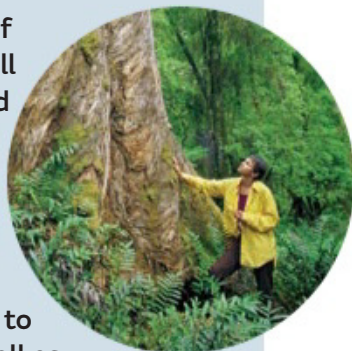
Follow him on

Twitter: @john_pickrell

WILD AUSTRALIA DIARY ENTRIES

TAS *Experience our largest temperate rainforest: Tarkine Forest Reserve*

The International Day of Forests on 21 March will focus on woodlands and biodiversity. Australia's biggest temperate rainforest, the Tarkine in north-western Tasmania, is a cool, lush wonderland, home to many bird species as well as Tassie devils, quolls and gliders. **More info:** call Stanley Visitor Information Centre on 03 6458 1330 or visit discoverthetarkine.com.au



WA *Swim with whale sharks, Ningaloo Marine Park*

Arriving in March and staying to August, majestic whale sharks congregate around Ningaloo Reef to take advantage of an abundance of plankton. You can take tours to swim and snorkel alongside them from both Exmouth and Coral Bay, led by a guide and following strict instructions from the WA Department of Environment and Conservation. **More info:** Call Ningaloo Visitor Centre at Exmouth on 08 9949 3070 or visit visitningaloo.com.au

QLD *See baby turtles dash for the surf at Lady Elliot Island*

On Lady Elliot, at the southern reaches of the Great Barrier Reef, baby green and loggerhead turtles emerge in their thousands from nests in the sand from February to April. At the island's Eco Resort, you may experience this at night in the sand dunes right in front of your accommodation, and also swim among turtles during the day. **More info:** Call Lady Elliot Island Eco Resort on 07 5536 3644 or visit ladyelliott.com.au



Talking Australia

Subscribe and never miss an episode of our entertaining new podcast.

Albert Wiggan ►

This Indigenous ranger from the Kimberley in WA is a powerful advocate for the role that Indigenous knowledge can play in land management for conservation. He was AG's 2019 Conservationist of the Year.



Corey Tutt

Corey works tirelessly to raise funds and books for his initiative Deadly Science. So far, the program has distributed 5000 books and 70 telescopes to Australian schools. For his efforts he was named the 2020 NSW

Young Australian of the Year. He's motivated to inspire other young Indigenous people and empower them to believe they can be whatever they dream to be.

John Rumney

John, a true legend of the Great Barrier Reef, was at the forefront of introducing eco-tourism to the Reef and remains committed to saving one of Earth's natural wonders.

Sarah Davis

Sarah discusses her training and meticulous prep to take on a seven-month journey full of peril: angry hippos, raging rapids, kidnapping threats and civil war to paddle the Nile River from source to sea.

Mal Leyland

Mal and his brother, Mike, filmed, produced and hosted several highly successful TV series, including the iconic *Ask the Leyland Brothers*, and inspired a whole generation of Australians to get out and explore their vast country. He even showed it could be done with a young family.

For a full list of our inspiring podcast guests, including Valerie Taylor, Terri Irwin and Dr Glenn Singleman, head to:

australiangeographic.com.au/series/talking_australia

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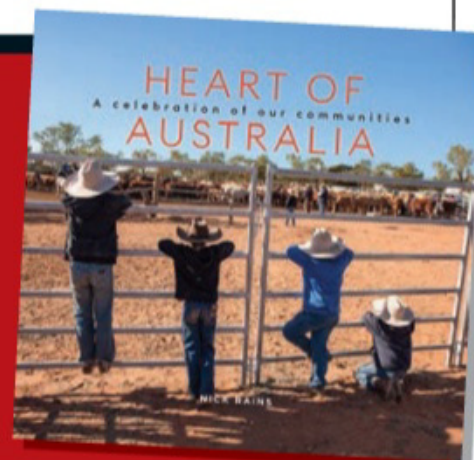
3. Tap on the cover
4. Tap on the purple "subscribe" button
5. Enjoy the podcast and please leave us a rating and review!

OR simply scan the QR code at left

ENTER Competition

We're giving away six copies of Nick Rains's *Heart of Australia* book (see page 114). Discover the vast array of community events happening on any given weekend around Australia in this visually stunning compendium. From the dusty glory of the Deniliquin Ute Muster, to the utopian ideal of the Woodford Folk Festival, travel around Australia and explore the fun, adventure and heart of the community event.

Enter at: australiangeographic.com.au/155





March • April 2020

Your Society

Australian Geographic Society news and events



Mission critical. RSPCA South Australia animal handler Cher Long, and RSPCA veterinarian Gayle Kothari, provide urgent care for an injured koala. Watch a video of them treating koalas on Kangaroo Island here: australiangeographic.com.au/ag155

Fundraising update

Society lends a hand

OUR BEAUTIFUL country has been scorched by bushfires since spring last year, and, while the fires may have eased somewhat, the work goes on for wildlife carers and their charges and those communities trying to recover and rebuild. In early November we pledged \$50,000 to the unfolding bushfire emergency, with the promise of the addition of a further \$1 from every purchase from the Australian Geographic online store until 20 December 2019. Your generosity helped us to donate almost \$60,000 to various bushfire-affected wildlife relief organisations. “The Society hopes these funds can help alleviate some of the heartache being suffered by the many Australians affected by these extreme bushfires and provide support to the many people working hard to help,”

says our Chair, David Haslingden. Money from the fundraiser will continue to be dispersed to support wildlife rescue and rehabilitation, habitat restoration and communities devastated by the fires. Thank you to all those members who generously donated funds to our appeal.

SPONSORSHIPS

Submission deadline

Applications for our project sponsorships close at midnight AEST on Thursday 30 April 2020. Australian scientists, community organisations and individuals developing projects in Australia and abroad are welcome to apply. For details and to apply, **visit our website:**

australiangeographic.com.au/society



ADVENTURE

Home again

The Swag Family (Nicola, Andrew, Hope and Wilfy Hughes) are now home, having completed their 14,011km, 350-day, tandem bike ride around Australia. “Our journey finished where it began, on our driveway in the rural hamlet of Flowerpot, Tasmania,” Andrew says. “In the intervening 12 months we pedalled some of Australia’s toughest outback roads with our three- and five-year-old children. The spirit of the country and its people seeped into our tired bones as we encountered generosity and hardship in equal measure.”



FROM AG TO THE UN

The human swan

In February this year, former AGS administrator Sacha Dench – aka ‘the human swan’ after her 7000km paramotor flight following migrating endangered Bewick’s swans from the Russian Arctic to the UK in 2016 – was named UN Ambassador for Migratory Species, at the UN Convention on the Conservation of Migratory Species of Wild Animals in India. Sacha hopes to bring attention to the plight of migratory bird species impacted by altered habitats along vital migration routes.



**SOCIETY
FUNDRAISER**

Expedition diary: Aussie Ark

AFTER HOURS of travelling to the Barrington Tops, I became part of the 2019 AGS Aussie

Ark Expedition. Within minutes, we were introduced to Tassie devils at feeding time – lots of growls, snarls, nips and chasing. Soon after we headed to one of the large, fenced paddocks where released devils were to be trapped for monitoring. My group was on trap-setting duty. Others set Elliot traps for small mammals.

After a quick barbecue dinner, we set out for an evening of spotlighting. The cold was creeping in and those of us who hadn't thought to grab a jumper before leaving started to get rather chilly. But what excitement! We spotted a bandy-bandy snake, baby diamond python, Davies' tree frog, eastern stony creek frog and a forest dragon. We were back by 10pm to collapse into bed and up again for breakfast before heading back to Aussie Ark (this time with jumpers). Our traps had about 10 devils in them, which needed to be weighed, have wounds dusted with antiseptic and a topical tick and flea treatment applied. In the Elliot traps



All in a days work.
Citizen scientists help weigh Tasmanian devils and share lunch with a bettong (left).



were five house mice, two antechinuses and a swamp rat. We also checked small macropod traps and were able to radio-collar potoroos and release two

bandicoots with pouch young. We built a 'soft' predator-proof fence enclosure from which animals will be gradually allowed to escape into the larger sanctuary when all the predators have been removed. The afternoon was spent resetting the rodent traps, feeding brush-tailed rock-wallabies and quolls and then ourselves. While eating, we watched a wedge-tailed eagle stealing food from the devil pens. They learn quickly! Our final morning was spent packing, processing the traps, feeding the menagerie and having one final cuddle of the joey Tassie devils and potoroo.

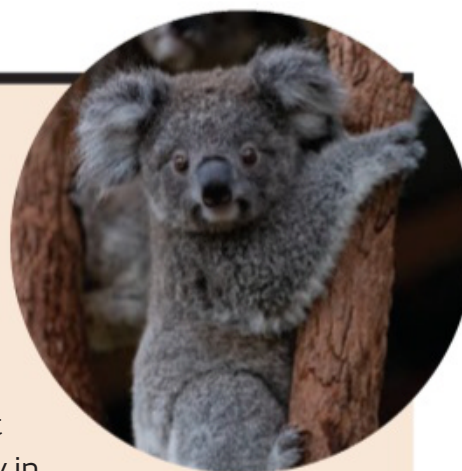
BETTY JACOBS

AUSSIE ARK 2020 DATES 7–9 October 2020 COST From \$1400
BOOKINGS Call 02 4340 8610 or email admin@devilark.org.au

AG SOCIETY FUNDRAISER KOALA ARK

Koalas face an unpredictable future (page 54). Populations continue to decline due to habitat loss, bushfire and disease, among other threats. More than 80 per cent of koala habitat has been lost, with remaining areas fragmented and vulnerable to bushfire, which can decimate populations within days, as witnessed this past summer.

Aussie Ark is launching the first and largest koala sanctuary in the world. The project aims to alter the declining trajectory of koalas in NSW by protecting up to 7 per cent of the wild population through exclusion fencing.



MAKE A DIFFERENCE. PLEASE DONATE TODAY

Funds raised will help save and support our koala population
Visit australiangeographic.com.au/fundraising or call 02 9316 7214.

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THE SOCIETY runs sponsorship rounds in April and November, during which it considers applications and disperses grants that are funded by the Australian Geographic business.

The Society also awards the Nancy-Bird Walton sponsorship for female adventurers and hosts annual awards for conservation and adventure.

Each year it gives in excess of \$100,000 to worthy projects.



Save the date

**The 2020 Australian
Geographic Society gala
awards will take place at the
Shangri-La Hotel, Sydney, on
Friday 30 October. Watch
this space for more details
and how to secure a place at
this popular event.**

SPONSORED BY THE AUSTRALIAN GOVERNMENT

SMOOTH SAILING

Thinking of exploring spectacular Antarctica?
Here's how to be best prepared for your grand
adventure to the icy continent.



Remote and wild,
Antarctica is a bucket-
list destination for
many Australians.

IT'S MIDNIGHT, AND YET, you can see your hand in front of your face as clear as day. You close your eyes, lay your head on your sleeping mat, and listen to the distant sound of cracking ice and, much closer, hundreds of chattering penguins. You're in Antarctica, camping... That's right, sleeping out on the great white continent! It's the middle of summer, and because the sun only briefly dips below the horizon, you're witnessing the melding of sunset and sunrise, the sky painted with an endless palette of extraordinary pastels. Antarctica and its incredible riches, have been on your bucket list for years, and finally, you're breathing it all in.



Antarctic drift: sea kayaking
among incredible icebergs.



Penguin puffballs: no visit to Antarctica is complete without meeting the local wildlife.

The stunning Antarctic Peninsula teems with wildlife that you'll want to meet.



Frozen fun: Antarctic cruisers join the exclusive 'polar plunge' club after launching themselves into the icy water.

Ensure your Antarctic travel insurance covers you for off-ship activities, so you can jump in with both feet!

There is a raft of activities to immerse yourself in while cruising the Antarctic Peninsula. From camping and sea kayaking, to snorkelling and skiing, and the much-anticipated polar plunge, you'll likely want to try them all. Picture yourself paddling beside a hulking iceberg and gazing into its iridescent blue heart. Feel the thrill of a leopard seal turning to meet your gaze. Marvel at the icy vista spread before you as you whistle down the side of a mountain on a set of skis.

Now imagine you've come a cropper and need emergency medical attention or worse, evacuation... you're a long way

from home and the latter can cost tens of thousands of dollars, if not more! Having the right travel insurance, which covers you for both the cruise and all the activities you'd like to try means that if anything does go wrong (and it can during polar exploration, as legendary Antarctic explorers Robert Scott and Earnest Shackleton both experienced), you'll have access to the help you need, when you need it most.



To be well informed and prepared for your next adventure visit: **smartraveller.gov.au**

STAYING SAFE

Because of Antarctica's extreme conditions and remoteness, it's vital to consult your doctor before you leave. Discuss the activities you'd like to undertake – off-ship activities bring with them an element of risk – especially if you have pre-existing conditions, and make sure you have enough of your regular medication to cover your time away and then some, in case of unexpected delays.

● SNORKELLING

Duck your head under Antarctic waters and you'll discover the speed and mobility of penguins in the water, marvel at sculpted icebergs below the surface and witness marine life including starfish and nudibranchs. Before you sign up, though, check with your polar snorkelling guides to cover off any concerns or limitations you may have, or help you may need.

● SEA KAYAKING

Sea kayaking here will move you. Following experienced guides, you'll paddle between icebergs, skim past penguin rookeries, or drift under soaring bird cliffs as you absorb the majesty. If you're heading out for a day trip, be sure to take any medications you need and surplus in case you get delayed for any reason.

● SKIING

Early explorers used skiing as a means to move across the continent – but it's relatively new for tourists. Without any infrastructure, you'll need to "skin" up the mountain before skiing down. That translates into a lot of work for relatively short (half-mile) descents, so pre-trip fitness training is recommended. Knowing your limits and sticking to them in such a remote locale is vital.

● GET COVERED

All Antarctic tour operator companies require guests to have a travel insurance policy that will cover emergency evacuation by air, repatriation and medical fees. You won't be able to board the ship without it! Also, read the fine print to make sure you're covered for all the activities you wish to undertake – some travel insurance policies stop covering you as soon as you leave the ship – and for unfortunate circumstances such as trip delays, interruptions and cancellations.



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BE INFORMED > BE PREPARED

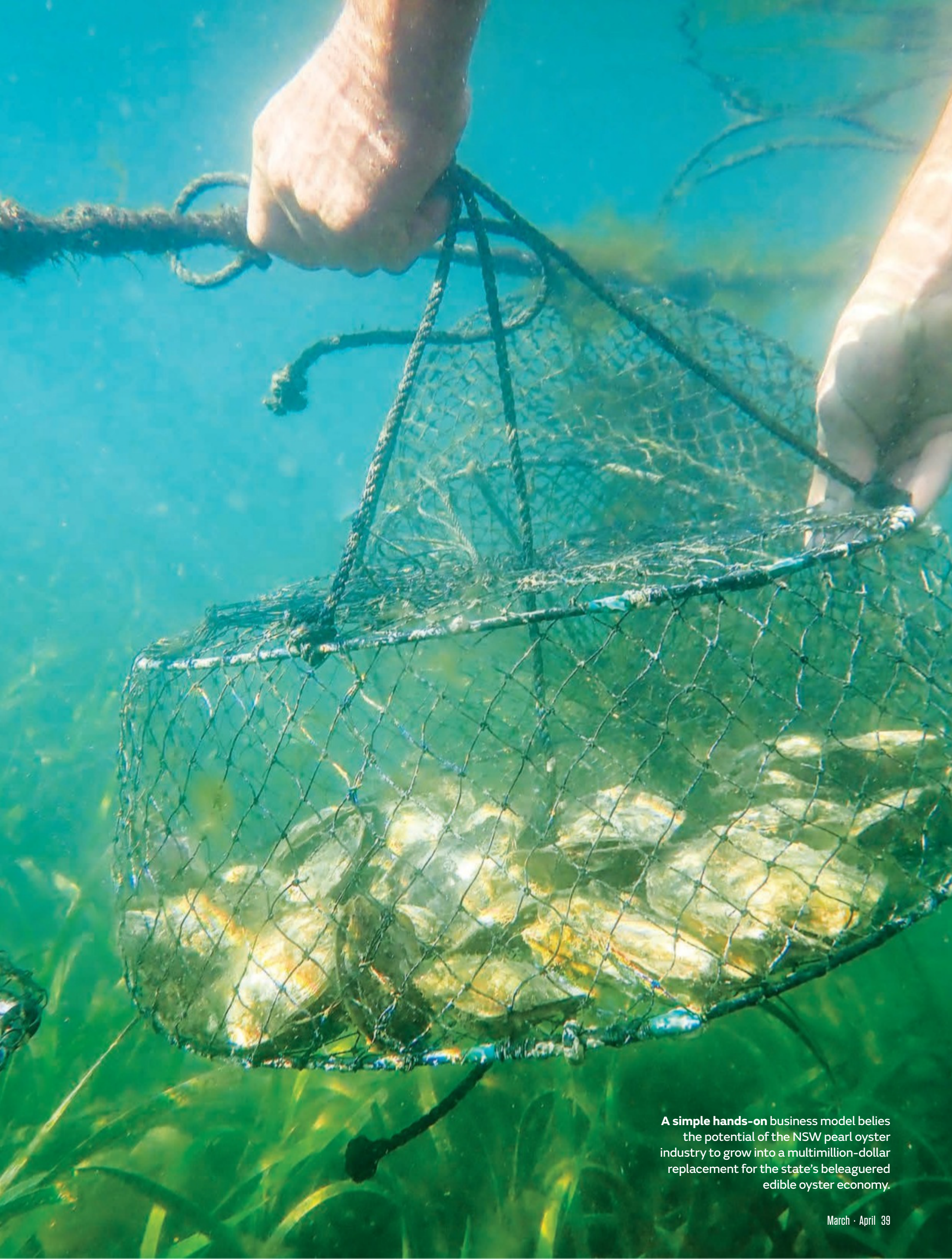
Pearls of promise

A nascent pearl industry is offering hope to oyster farmers in New South Wales.

STORY AND PHOTOGRAPHY BY ESTHER BEATON

The NSW pearl oyster was unexploited until it was found to be the same species cultivated for pearls in Japan for the past 100 years. It's now often referred to as the akoya pearl oyster.





A simple hands-on business model belies the potential of the NSW pearl oyster industry to grow into a multimillion-dollar replacement for the state's beleaguered edible oyster economy.



► **Pearl seeding involves** opening the living oyster only as far as it does to feed, then implanting a tiny piece of graft tissue deep in its reproductive area.

▼ **Rose Crisp (at rear)** was trained in the once-secretive process of pearl seeding by a visiting Japanese technician. Perhaps the first female seeder in Australia, she has since trained young local jeweller Celeste Boonaerts.



IT'S A HOT FEBRUARY morning but I feel cool relief as I step into the darkness of a little fibro shed. Rickety stumps and overgrown mangroves signal this is one of many old oyster sheds dotted along the shores of Broken Bay, a large estuary about 50km north of Sydney's CBD at the confluence of the Hawkesbury River, Pittwater and Brisbane Water. The handwritten letters "BBP" above the doorway are the only clue this one is not abandoned. Nestled on Brisbane Water, Broken Bay's northern arm, it is the home of Broken Bay Pearls, a company at the heart of a new, multimillion-dollar pearl farming industry on Australia's east coast.

Two women sit just inside the door, focused on their mission. Rose Crisp, the elder of the pair, will seed 300 oysters before today's end. She rises and walks to the end of a narrow jetty, hauls out a sludge-covered mesh bag and carries it back to her seat, where she works by torchlight. She delicately and methodically reaches for an oyster and clasps its shell open with a small blue clip. With surgeon's steadiness, she inserts a 3 x 3mm square of saibo (shell-producing mantle tissue from a donor oyster). Just as carefully she next inserts a small mother-of-pearl bead into the oyster's gonad. This is the nucleus around which the oyster will secrete layers of nacre (the hard, iridescent substance that forms the inner layer of an oyster shell), gradually building a pearl. Rose puts the oyster aside and its lips slowly close.

Seated beside Rose is Celeste Boonaerts. She's younger and newer at this highly skilled pearl seeding but seems just as meticulous. As I chat to them, the women don't miss a beat, carefully tucking saibo into shell after shell of native akoya oyster.

IN AUSTRALIA, PEARL cultivation began with marine biologist William Saville-Kent, who pioneered the scientific management of Australia's fisheries in the 1880s. As Tasmania's inspector of fisheries, Saville-Kent was tasked with restoring the state's badly depleted oyster beds. He rebuilt them by establishing government reserves and introducing minimum-size regulations, among other things, and went on to apply the same techniques in Victoria, Queensland and Western Australia. Over the years, Saville-Kent experimented with culturing pearls, particularly on Thursday Island, in far north Queensland. By 1904 he was one of the first in the world to successfully produce spherical cultured pearls of commercial quality.

How Rose and Celeste came to be seeding oysters in this shed on Broken Bay's mangrove-lined backwaters, and how pearl farming came to the NSW coast is another story.

In the 1990s, Rose and her husband Ian ran one of many businesses farming edible Sydney rock oysters in Broken Bay. But the Sydney rock oyster industry has faced a range of environmental challenges and for the past decades production has been in decline. In the early 2000s, the parasitic QX disease swept through the Hawkesbury, depleting oyster stocks and virtually wiping out the region's oyster growers. Many businesses switched to farming introduced Pacific oysters but another disease soon struck: the viral Pacific Oyster Mortality Syndrome (POMS). By 2015 hundreds of livelihoods were lost and the NSW oyster industry and its farmers were on their knees. Amid this gloom for the edible oyster fisheries of NSW, a sliver of hope appeared in the form of pearls.



▲ **Oysters won't survive** in polluted waters, explains Steve Williamson as he looks across the healthy estuary of Brisbane Water from the headquarters of Broken Bay Pearls.

Amid this gloom for the edible oyster fisheries of NSW, a sliver of hope appeared in the form of pearls.

“Back in the late '90s, two Japanese companies started to show an interest in pearling in NSW,” says Dr Wayne O'Connor, principal research scientist at Fisheries NSW. The companies were interested in exploring akoya oyster farming in NSW in an effort to produce better quality pearls – the species occurs naturally from as far north as Japan to just south of Sydney. “They were going through a downturn in the quality of stock in Japan and starting to look for other areas to try and farm pearl oysters,” Wayne explains. “They realised that if they moved further away from the tropics, the quality of the nacre, or the pearl material inside the shell, seemed to get better and better.”

A Japan–Australia consortium was soon set up and the Australian Museum was contracted to do a survey of akoya oyster populations on the NSW coast.

“The quality of the nacre was really, really good,” Wayne says. Fisheries NSW, tasked with saving the state's failing edible oyster industry, saw an opportunity. “One of the caveats we had was that if we produced pearl oysters to support their industry developments, we would like farmers from NSW to have the opportunity to become involved.”

Ian Crisp was one such farmer. “We started to see a lot of small oysters of another species caught on our Sydney rocks,” Ian says.

“That coincided with the research that Fisheries had been doing on the pearl oyster and we very quickly realised that this was the same species.” Ian was able to confirm that akoya oysters naturally occurred at one of their farms on Brisbane Water. “Basically I kicked the door in and said, ‘Look, we want to have a crack at this.’”

By 2003 Ian and Rose had succeeded in farming akoya oysters and, more importantly, in growing pearls as well. But the Japanese consortium failed to obtain a licence for commercial operations and was forced to leave.

The Crisps and their newly formed company, Broken Bay Pearls, were left without support. They'd had the foresight to get Rose trained in the implantation process, but the young company was not yet viable.

Amid these despairing prospects, a saviour appeared: third-generation pearl farmer James Brown, manager of Cygnet Bay Pearls, a long-standing pearl farm located north of Broome, in WA. His was one of only three companies to survive calamitous losses of pearl oysters in the Kimberley in 2007 and the 2008 global financial crisis. “I contacted the guys at Broken Bay and said, ‘I'm finally coming to Sydney. I'd love to come and have a look at the farm,’” James says. ▶



Tourists are surprised to see an oyster, plucked from waters off the seemingly ordinary NSW Central Coast district of Woy Woy, opened before their eyes by James Brown to reveal a fresh new pearl.

But Ian and Rose were in the process of selling their business. “I wrote back and said that I might be an interested party... I got a phone call almost instantly,” James says. They formed a new umbrella company, Pearls of Australia, and the Crisps became shareholders. Their years of hard work had paid off.

When it came to the business of pearls and marketing, James had ideas. During the economic slowdown in WA, he successfully introduced tourism to his Kimberley operations, and he set about employing the same tactic to the east coast operations.

I’M EXCITED TO be among a throng of tourists boarding a boat at Woy Woy Wharf, on Brisbane Water. Sydney rock oyster farmer Steve Williamson is at the helm, operating the tour on behalf of Broken Bay Pearls. He motors our catamaran to the middle of the estuary and slows. We stare at a line of black buoys while he talks about the pearling process. We are mostly uninspired. He motors away and kills the throttle again, this time close to the little shed where Rose and Celeste had been seeding oysters. Like a magician, he pulls out a tray spread with surgical instruments. Now he has our attention.

From a sludge-covered bag, he pulls out a tightly closed oyster. Waving a knife, he explains how Broken Bay Pearls grows tens of thousands of oysters each year, but only 30 per cent yield a pearl, and fewer still a good one. He levers the oyster’s shells apart and 40 tourists erupt from their seats, hardly believing their eyes. There, nestled among the oyster’s squishy organs, is a jewel – rare and beautiful as only nature can create.

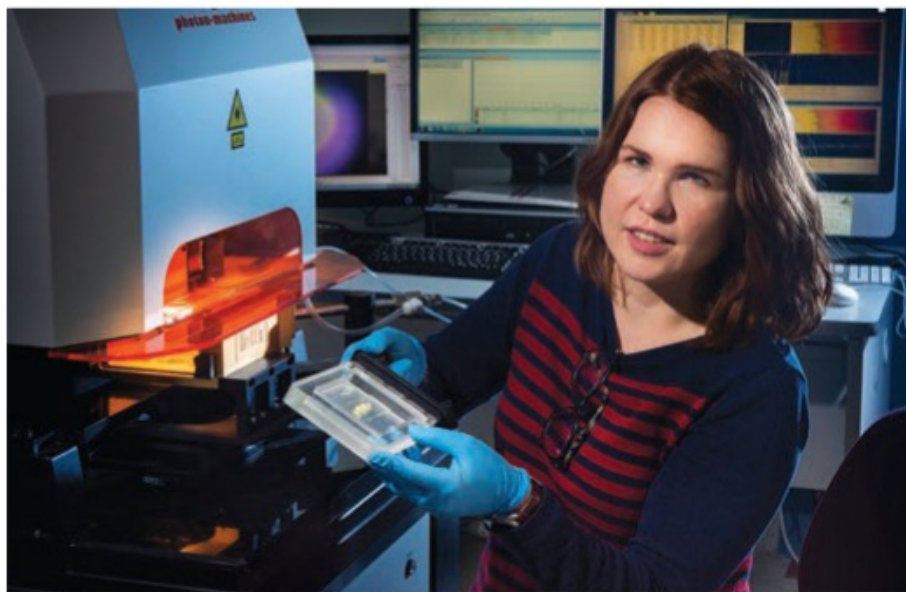
Broken Bay Pearls is the only pearl farm operating in NSW, and it produces some of the best cultured akoya pearls in the

There, nestled among the oyster’s squishy organs, is a jewel – rare and beautiful as only nature can create.

world. In 2017 German PhD student Laura Otter, who is based at Macquarie University, in Sydney, visited the Brisbane Water farm with her supervisor. They noticed that the pearls featured an unusual colour palette. “We were sitting there collecting the shells and thinking, ‘Well, this is weird; these pearls look super special,’” Laura says. Upon opening some of the oysters, she noted that they occurred in a wide variety of colours, ranging from classic white and silver to more unconventional colours such as yellow, orange, pink and blue. “I got this golden yellow pearl and it was just amazing to see because the akoya pearl usually is white...not yellow or golden, or even blue, which these were,” she says.

To confirm that these pearls differed from those grown elsewhere, Laura used a high-powered Raman spectrometer to distinguish the components of the nacre. No-one expected the result: the pearls were so unusual that Laura’s findings were disputed when she submitted her article to the scientific community for peer review. “I actually had to convince the reviewers that these are really the natural colour palettes available and that they’re not enhanced afterwards,” Laura says. “No-one had ever seen this before.”

▼ **Laura Otter** uses a laser ablation inductively coupled plasma mass spectrometer to analyse minerals in Broken Bay pearls and identify the pigments that contribute to their stunning colours.



▼ **Oysters** use nacre, their mother-of-pearl shell lining, to create pearls but only a few species can do it. The gold hue, a feature of Broken Bay gems, is one of many colours they are yielding.



A growing number of Australian retailers have embraced the Brisbane Water pearls and are using them to create locally manufactured jewellery, although that hasn't always been the case. Their distinct colour palette was a problem Ian faced when he first tried to sell them. "At that stage we had a jewellery industry in Australia that hadn't seen an unbleached, undyed akoya pearl since the 1960s," he says. "No-one in the Australian jewellery market understood what we were doing."

Ian traipsed through Sydney with bags of pearls, trying to sell to jeweller after jeweller with no luck. "I'd basically given up," he says, but eventually walked into Percy Marks, a long-established Australian jewellery business. The general manager Cameron Marks knew the value of what he saw immediately. "We knew at that point we had quality pearls," Ian says.

THE NSW PEARL industry is looking promising, although an assured future is impossible to predict. Oysters are often known as the canaries of estuaries, because their health reflects waterway health. Around the world, oyster losses are linked with urban pollution, ocean acidification, algal blooms, coastal development and overfishing, which is a ever-green issue. In the late 1800s in Australia, Saville-Kent tried to rein in pearl shell overfishing in Torres Strait, where 10,000 tons of shells were harvested annually, depleting the shallows.

There is a long history in NSW of oyster losses due to environmental factors and disease, but Broken Bay Pearls has the support of Fisheries NSW, and Wayne O'Connor is determined to protect the pearl oysters of Brisbane Water. It is a good industry for the estuary, because oysters need no food added to the water, and the farms require no chemicals or fertilisers. The molluscs also filter the water – the best pearl oysters are large ones that live for two or more years, filtering some 25L of water per hour as they feed on algae and minute organisms.

"What's happened with every oyster industry is that they have developed and then along the way they've had a number of different challenges," Wayne says. These have included food-borne illnesses, norovirus outbreaks, QX disease and winter mortality disease. "The pearl industry will definitely face these challenges," he says. "The key to riding through is to make sure [it is] diversified."

Wayne means not just business diversity but also genetic diversity. His lab is running trials to produce disease-resistant

oyster strains and to implement breeding programs to protect stocks. "The other thing is to be really diligent about monitoring the health of your oysters and looking for threats," Wayne says. "Don't wait for the point where it becomes economically unviable to farm. It's important to note when you've got unusual mortalities and use the facilities available to you."

The hatchery facilities of Fisheries NSW supply Broken Bay Pearls with young oysters. "All of the small spat are produced by us," Wayne says. "For them to commercially contract a large hatchery to do it would be a very expensive process. The cost of producing algae, the cost of running the pumps, doing all of that can be leveraged against our general activities, so we can do it very, very cheaply."

For a fledgling industry, having the support of modern scientific research and data, as well as business acumen and years of oyster farming experience, is a good recipe for success. The future of the company looks promising.

IT'S WINTER WHEN I next visit the shed. The dawn temperature is only 7°C but I'm too excited to feel the cold. Steve Williamson pilots our punt to an undisclosed location and begins hauling in crates. I lean into the frigid water, hoping I can keep a grip on my underwater camera and avoid falling in. These oysters are not the batch I observed being seeded six months ago; these were seeded a year earlier. This year's harvest will be smaller than the normal 10–30,000 shells, because James Brown wants to reserve many for their "shellar door" tours, an upcoming tourism experience that will be similar to winery cellar door tastings.

Back in the shed, Steve opens shells and passes them to Celeste. She's full of anticipation. "You get to see them in the light for the first time, coming out of a dirty shell," she says. "You've birthed this little pearl." She prods the oyster's flesh, seeking that prize of all prizes, a perfectly formed and lustrous gem-quality pearl. Some oysters have an implanted bead without any nacre deposits; some contain beads that are only half covered; and some shells only house keshi, tiny natural pearls produced by the oyster in response to irritants. But many do contain shimmering, perfectly rounded pearls. These gems represent hope for the NSW oyster industry. As Cameron Marks said: "They're beautiful, beautiful pearls. Everything Australian is good if you harvest it in beautiful pristine waters."

AG

A black summer

DURING THE SPRING and summer of 2019-2020, Australia experienced a catastrophic bushfire season with tragic loss of life and extensive destruction of and damage to property, natural landscapes and native and domesticated animals. The full economic losses are yet to be calculated but the timing of the crisis, during the traditional Australian summer break, has had a serious impact on domestic and international tourism.

On the following pages is a visual explanation and summary of the causes and effects of the bushfire emergency as it was in early February 2020 and with some weeks of the usual annual bushfires season in the southern states of Australia yet to go.

We look at some of the record-breaking statistics and put this year's fire season in the context of major fire emergencies and events throughout the past 100 years. We describe the forces and systems that drive weather and climate in our own region and place them into the context of warming climate trends globally. We show the processes in which large intense bushfires create their own weather, which in turn exacerbates their intensity and size, and how, in this season, such events have been witnessed in numbers never seen before.

 Indicates areas burnt

• Perth

Amount of CO₂ released by Australian bushfires

306 million tonnes

Total annual CO₂ emissions
in the space of
3 MONTHS

**AIR
QUALITY**

2334
PROSPECT, NSW
19 Nov 2019

568
CANBERRA
2 Jan 2020

540
SYDNEY
19 Nov 2019

Air Quality Index	Levels of Health Concerns	Colours
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Darwin

\$500 million
in bushfire donations

>1 billion native animals killed

Total area burnt

>16 million hectares

5900

buildings destroyed

Amazon fires 2019 890,000 hectares burnt
California fires 2018 809,000 hectares burnt

more than
twice the size
of TASMANIA

3600

Firefighters
deployed
including
34 US 66 CANADA 46 NEW ZEALAND

Fatalities:

33

including 9
firefighters

Aerial firefighting fleet:

140 aircraft

including 11 large tankers



People urged to evacuate:

250,000+

1100

Evacuated by ship and 500 by air

3000 homes lost

\$1.34 billion

Estimated insurance losses

Queensland 6.6 million ha burnt
Western Australia 2 million ha burnt

FACT

18 Dec 2019 was
Australia's hottest
recorded day ever

41.9°C
nat. avg

The smoke cloud from the bushfires
affected air quality in

**New Zealand and
South America**

NEW SOUTH WALES

5.46 million
hectares burnt

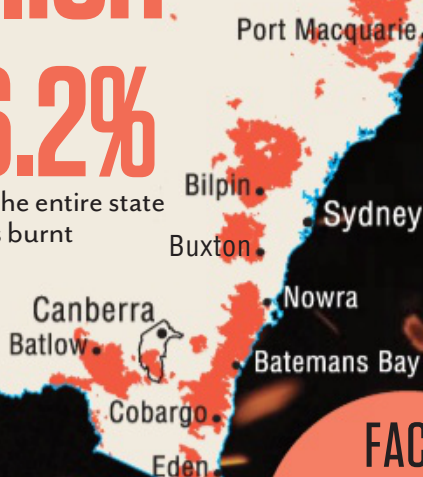


Fatalities:

20

6.2%

of the entire state
has burnt



FACT

55 parks or
reserves
have had more than
99% of their area
affected by fire

OVER 35%

of the national park estate has
been impacted. In key bioregions,
the figure is well over 40%

MORE THAN 80%

of the World Heritage listed Greater Blue Mountains
Area and 54% of the NSW components of the Gondwana
Rainforests of Australia World Heritage property have
been affected by fire

60 threatened
fauna species
affected

Area burnt is
larger than
The Netherlands

VICTORIA

1.53 million
hectares burnt

hectares burnt

6422

livestock losses in
North East and
East Gippsland



Fatalities:

5

405

residential and 653
non-residential
structures have
been either dam-
aged or destroyed
by the fires

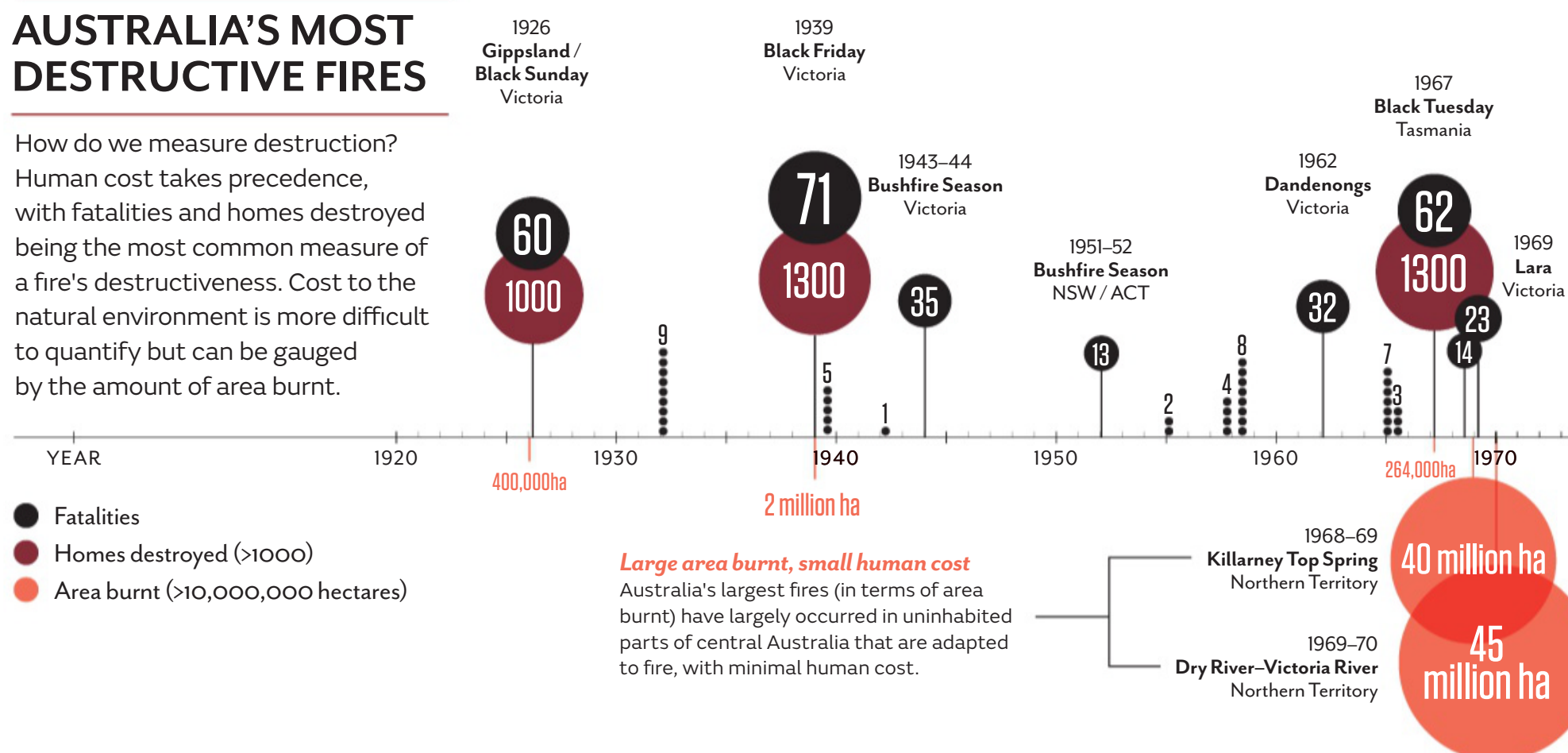
FACT

More than half of
the habitat of **173**
rare and threatened
species has been
impacted by fire



AUSTRALIA'S MOST DESTRUCTIVE FIRES

How do we measure destruction?
Human cost takes precedence,
with fatalities and homes destroyed
being the most common measure of
a fire's destructiveness. Cost to the
natural environment is more difficult
to quantify but can be gauged
by the amount of area burnt.



KANGAROO ISLAND

211,255
hectares burnt



SOUTH
AUSTRALIA

KANGAROO
ISLAND

FACT

A total area of
448,685ha burnt
across the state of
South Australia

48%
of the island
affected

Livestock lost

32,000

612 km
fire perimeter

50%

of the last, large,
chlamydia-free population
of koalas is estimated
to have perished in the
Kangaroo Island fires



Fatalities:

2

89

dwellings
destroyed

296

outbuildings
destroyed

276

vehicles
destroyed

280

Defence force
personnel
deployed

1983
Ash Wednesday
South Australia / Victoria

75
2400

Most deaths
Australia's most destructive
fire by number of fatalities,
with relatively small area burnt

2009
Black Saturday
Victoria

173
2000

2019-20
Bushfire Season
Nationwide

33
3000

**What makes the
2019-2020 fires
so destructive?**

These fires were the
first to burn such a large
amount of area close to
human populations, with
multiple fires burning
simultaneously across the
country, many in areas not
previously prone to fire.
This resulted in high levels
of destruction on many
levels: fatalities, homes
destroyed and area burnt,
reflecting a huge cost
to humans and the
natural environment.

Sources: Australian Disaster Resilience
Knowledge Hub; Forest Fire Management
Victoria; Victorian Department of
Sustainability and Environment; Risk
Frontiers Macquarie University; CSIRO;
Australian Bureau of Statistics;
Australian Institute of Criminology

1974-75
Bushfire Season
Nationwide

117
million ha

Remote locations

Fires mostly located in
largely uninhabited
parts of Australia.

2002
Northern
Territory
38 million ha

16
million ha

A CHANGE IN THE WEATHER

IN AUSTRALIA, 2019 was officially the hottest and driest year since records began (Figure 2) with 18 December officially the hottest day ever with a mean national temperature of 41.9°C. The country as a whole was 1.52°C above the Bureau of Meteorology's (BOM) 1961–1990 average. Global temperatures for 2019 were 1.1°C above the 1961–1990 average, making it the second-warmest year globally since 1880.

Long-term climate trends show clear warming (Figure 1) with a resulting increase in the duration and intensity of the annual bushfire season. Australia has warmed by 1.4°C since 1910 with most of that increase taking effect from 1950 onwards. Nine of our 10 warmest years have occurred since 2005 including each year since 2013.

The national total rainfall for 2019 was 40 per cent below average (Figure 3), making it the driest year since records began,

although some northern regions saw above average rain in the early months of 2019, leading to flooding in parts of Queensland. Low humidity has increased fuel loads and made previously cool, moist and fire-resistant temperate rainforest gullies more susceptible to fire than ever before.

Australia has seen long periods of either wet or dry weather throughout recorded meteorological history and current trends are in part attributable to natural variability, but there are high levels of scientific confidence in the role played by human-induced climate change in the weather patterns that led to the optimum conditions for the 2019–2020 catastrophic bushfire season. Longer and more intense fire seasons are reducing the effectiveness of existing fire management strategies.

Figure 1

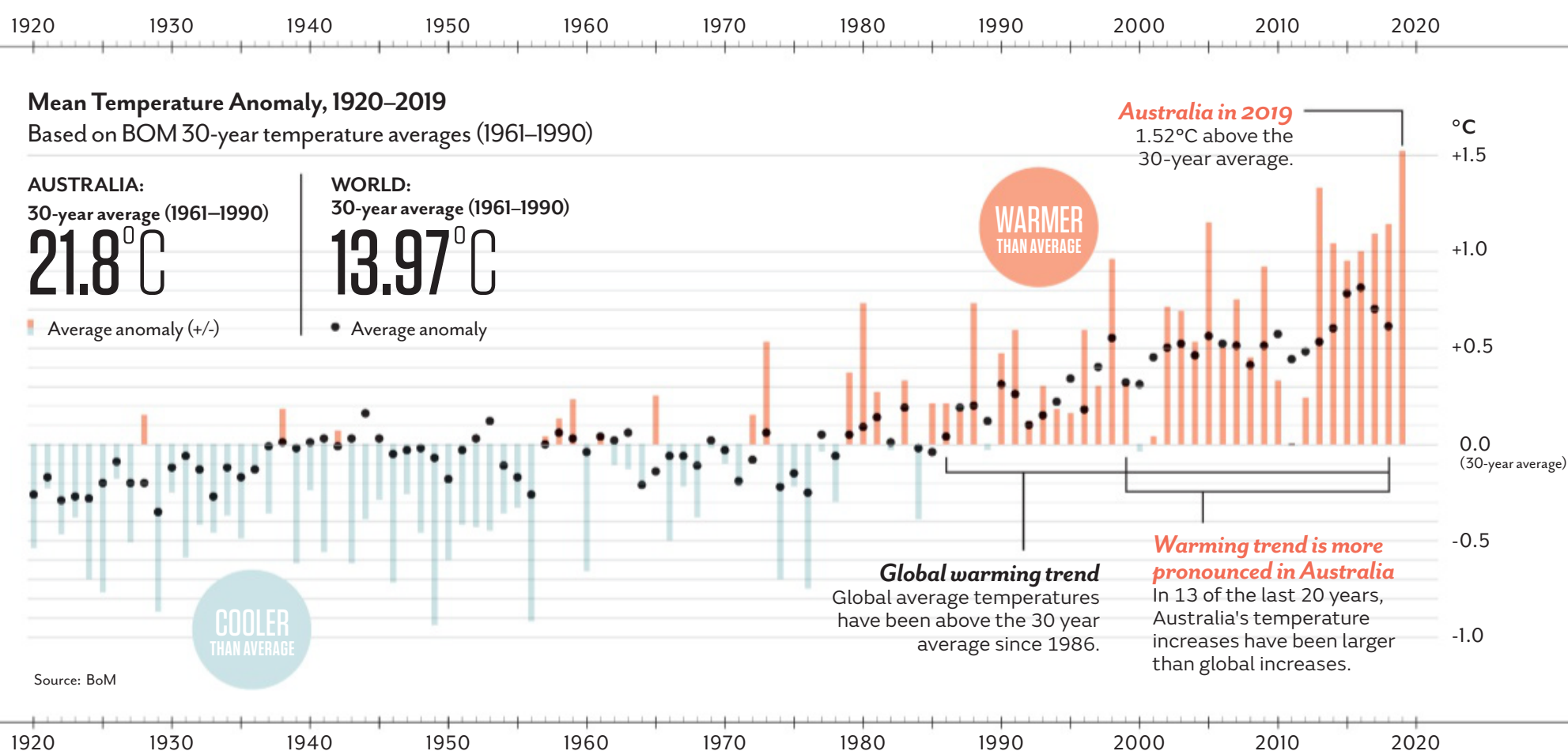


Figure 2

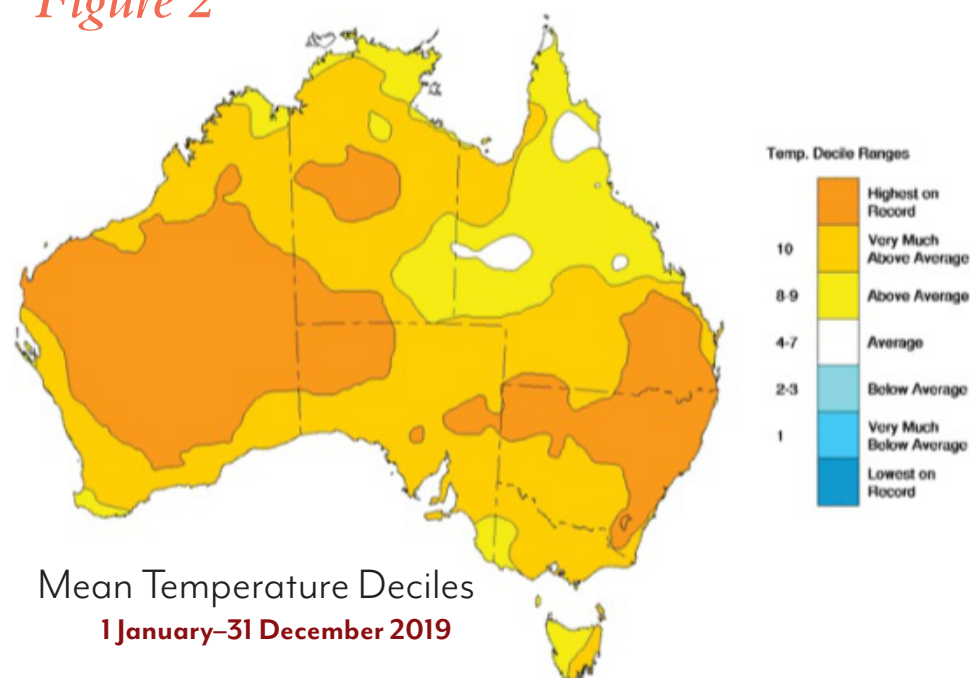
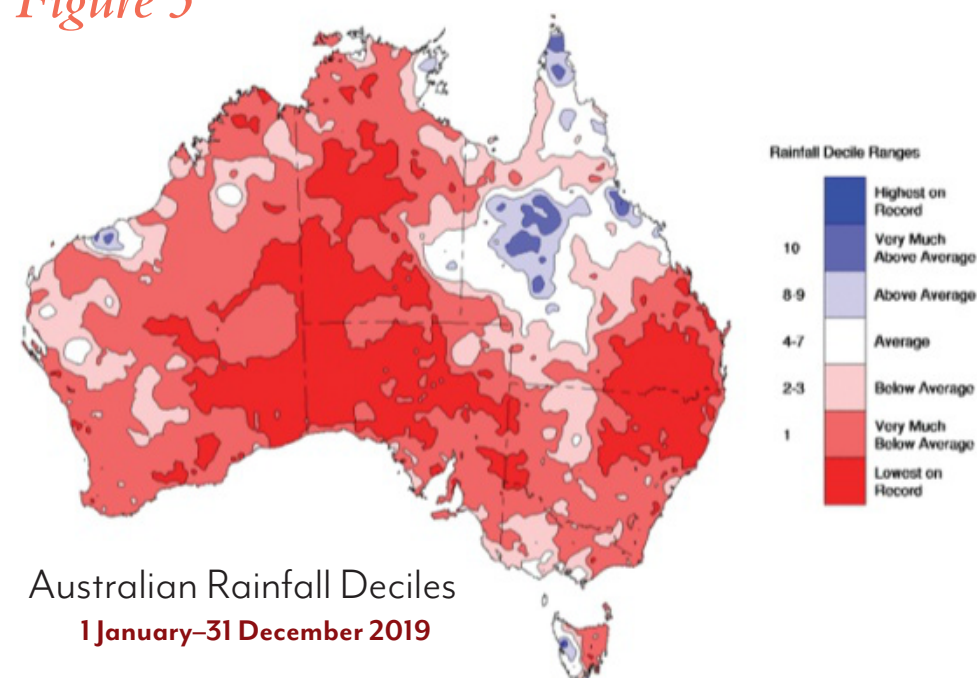


Figure 3



Source: BOM

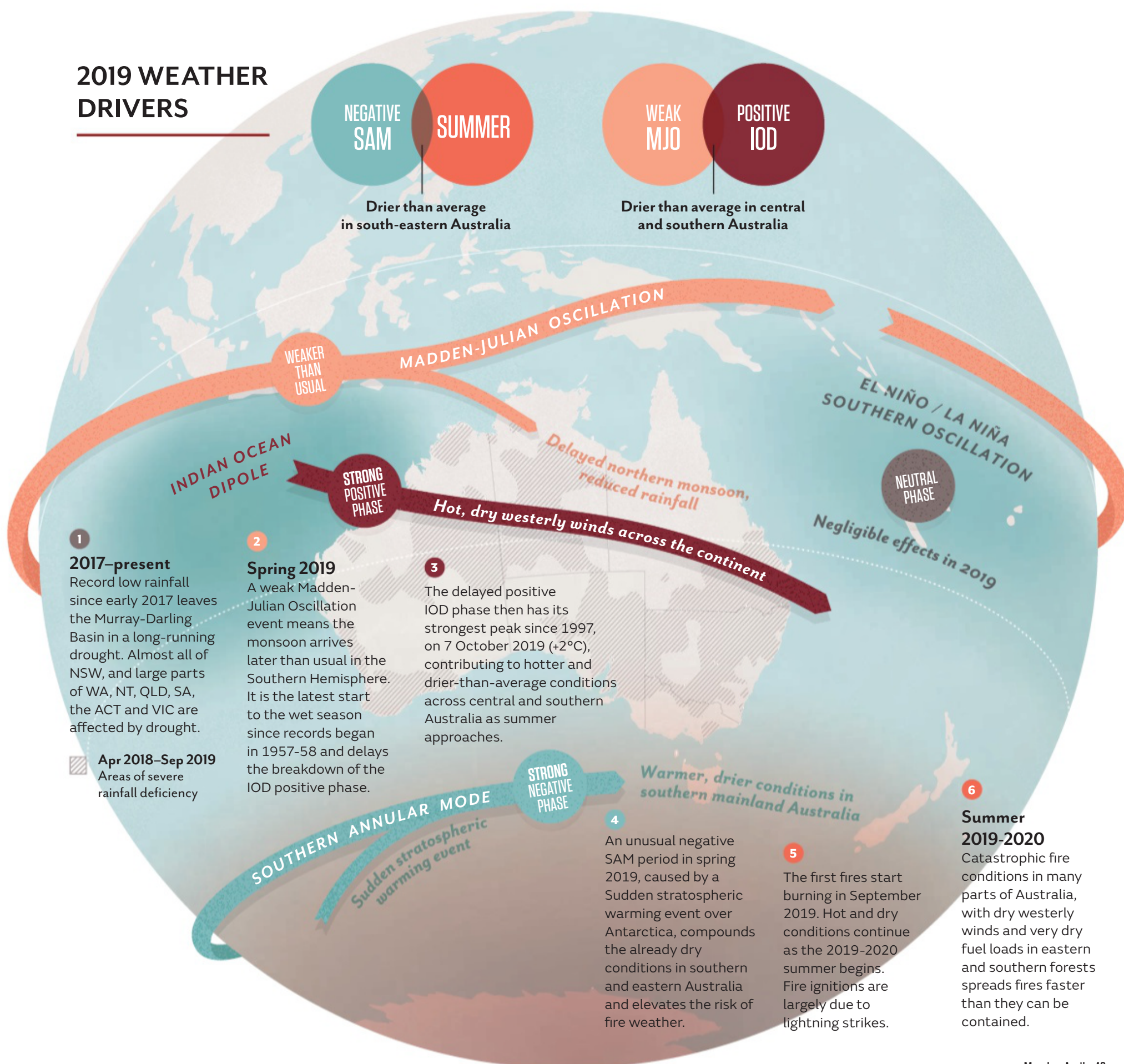
AUSTRALIA'S HIGHLY VARIABLE climate is influenced by a range of oceanic climate systems, in particular the El Niño-Southern Oscillation Index (ENSO) in the Pacific Ocean, the Indian Ocean Dipole (IOD) and the Southern Annular Mode (SAM) over the Southern Ocean.

While 2019 saw a neutral El Niño mode, a strong positive IOD, characterised by cooler waters in the Indian Ocean off northern Australia and warmer waters off Africa, contributed to the lack of rainfall across southern Australia. Long-term observations indicate that positive IODs have increased in frequency and strength since the 1960s. This is likely to continue with climate change, which is also causing the SAM to become more positive. This moves storm tracks south, reducing winter rain over southern regions as part of a longer-term drying trend. In spring 2019 an unexpected warming event over the South Pole – a Sudden Stratospheric Warming – shifted the SAM into temporary negative mode. This drew hot air from the centre across southern Queensland and into the south-east regions.

This increased temperatures, decreased cloud cover, exacerbated existing drought conditions and lowered soil moisture, making fuels drier and more prone to burning, heightening the risk of large bushfires.

Fire weather is largely monitored by the Forest Fire Danger Index (FFDI), which estimates the potential fire danger based on observations of temperature, humidity, wind speed and a drought factor to represent fuel dryness. Daily FFDI values can be accumulated during longer periods of time and these values for spring 2019 were the highest on record for 60 per cent of Australia, significantly higher than the previous highest values in 2002. By the start of September 2019, much of south-eastern Australia was already primed for high fire danger ratings, heralding the start of what would become a catastrophic fire season that would kill 33 people, including nine firefighters, destroy 3000 homes and burn more than 16 million hectares of land with a devastating impact on native biodiversity.

2019 WEATHER DRIVERS

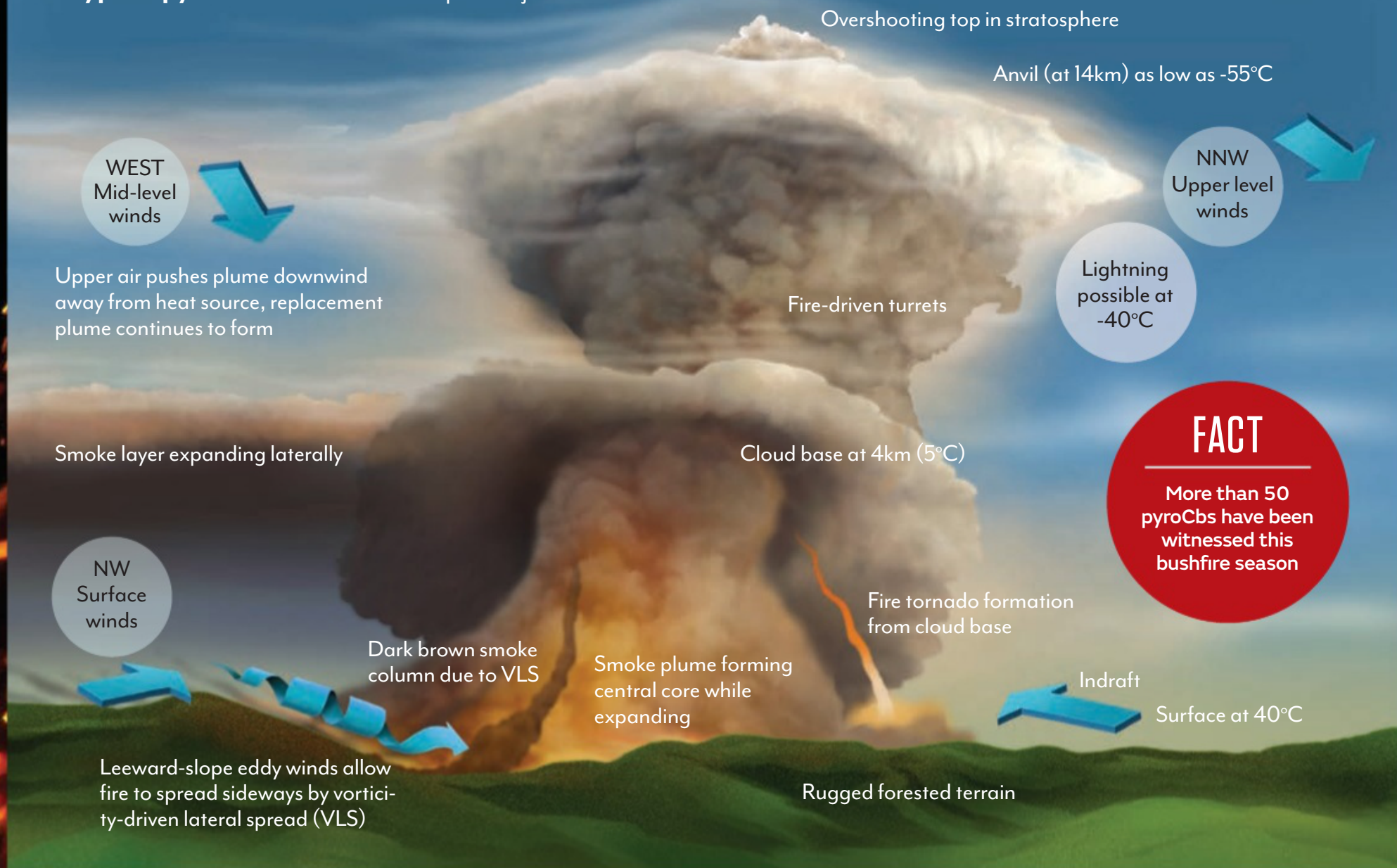


PYROCUMULONIMBUS

Bushfires can create their own deadly weather.

A typical pyroCb event

Stratospheric injection



A LONG WITH WEATHER that creates optimum conditions for destructive bushfires, the fires themselves can create their own weather. When a number of factors come together, including the type of terrain, extremely hot bushfires that feature intense areas of flaming that extend a long way back from the fire front can develop into deadly firestorms. Extreme heat generated from such fires sends dense plumes of smoke as far as 15km up into the atmosphere. Depending on atmospheric conditions at these altitudes, smoke plumes can trigger a type of fire thunderstorm known as a pyroculonimbus, or pyroCb for short. Research suggests that bushfires can be made more severe by feedback mechanisms driven by the atmospheric instability that results in the formation of pyroCbs.

PyroCbs are visible as tall, billowing smoke clouds with a flat base and anvil-shaped head. If the bushfire is powerful enough and the atmospheric conditions unstable, thunderstorms can lead to down-burst winds, strong inflow, fire tornadoes and lightning strikes. They can cause dangerous and unpredictable bushfire behaviour with strong, rapidly changing winds and large ember attacks that help spread the fire quickly, making it difficult for firefighters to manage. The incidence of pyroCb events is increasing as Australia's bushfire seasons lengthen and the intensity of fires grows.

In this 2019–2020 fire season, more than 52 pyroCbs have so far been observed, far exceeding any previous records. Climate modelling indicates that unabated global warming will cause further increases in the potential for the type of extreme bushfires that lead to pyroCb events in the future.

DATA SOURCES AND ACKNOWLEDGMENTS

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2019/2020 BUSHFIRE CRISIS

Unbearable loss

Thousands of koalas
were killed in the recent
bushfire emergency, but
keeping the species from
extinction is more than
just a numbers game.

STORY BY KAREN MCGHEE
PHOTOGRAPHY BY DREW HOPPER

A close-up photograph of two koalas, Thomas and Shelby, perched on a tree branch. Thomas is in the foreground, looking directly at the camera with a curious expression. Shelby is slightly behind him, also looking towards the camera. Both koalas have thick, grey fur and large, dark eyes. The background is dark and out of focus, emphasizing the koalas.

Although koalas are solitary as adult animals, these two 10-month-old joeys – Thomas (at rear) and Shelby – are being rehabilitated together by expert wildlife carers for the Port Macquarie Koala Hospital to compensate for both having lost their mums to fire on the NSW mid-north coast.

▼ **Now well on the path to recovery,** bushfire survivor Paul, named after the man who found him, has his dressings changed at the koala hospital.



WHEN PAUL WAS handed to Barbara Barrett in a washing basket to take home last November, he was given a slim chance of survival. He lay curled up in a ball on old towels, burnt, traumatised and barely moving.

“We thought he might not make it,” Barb, a koala carer with two decades experience, recalls of the young male koala. But there was a chance, so he was patched up, made comfortable and entrusted to her to try to rehabilitate him. He’d been rescued by a man named Paul, hence his adopted name, from a still-smouldering fireground near Port Macquarie, on the New South Wales mid-north coast, after one of the first of the fires that went on to rage throughout summer across south-eastern Australia. His ears were singed and the fur on his rump and quite a few of the nails on his paws had been burnt. Some of the claws dropped off a few weeks later meaning that, if he did survive, climbing vertically up a tree trunk would be near impossible.

His thick protective coat was still intact across much of the rest of his body, protecting his skin as it should have from direct searing. But it was thought likely that, because he was singed, he would have radiant burns beneath it caused by the intense heat of the fire he’d survived.

ULTIMATELY more than 16 million hectares of bushland, much of it national park, state forest or world heritage area, burnt.

The world watched in horror and understandably wept along with Australia at the tragic loss of human life and properties that resulted. But perhaps what was unexpected was the widespread and heartfelt dismay about what the fires – hotter and more widespread than anything seen before – were doing to Australia’s largely unique biodiversity.

Leading ecologists around the country, including the University of Sydney’s Professor Chris Dickman, did untold interviews with media outlets from dozens of countries as it

became clear what the planet could be losing forever in the Australian bushfires.

Based on animal density measurements that he’d made in NSW forests during unrelated research before the fires, Chris calculated that at least 800 million individual animals were killed in the NSW fires alone. That figure, he determined, could realistically be extrapolated to the other states affected by the crisis – Victoria, Queensland, South Australia and Western Australia – to more than a billion. “And that was just terrestrial mammals, birds and reptiles,” he says. “It doesn’t even take into account forest bats, frogs and fish.”

Chris and some of his esteemed colleagues quickly got together and estimated that between 20 and 100 species of vertebrate animals and plants would be pushed close to the brink of extinction. This included the long-footed potoroo, greater glider, Kangaroo Island dunnart, black-tailed dusky antechinus, silver-headed antechinus and Hastings River mouse. Professor Mike Lee, an evolutionary biologist at Flinders University, SA, estimated that the number of insect species that could now be facing extinction was 700.

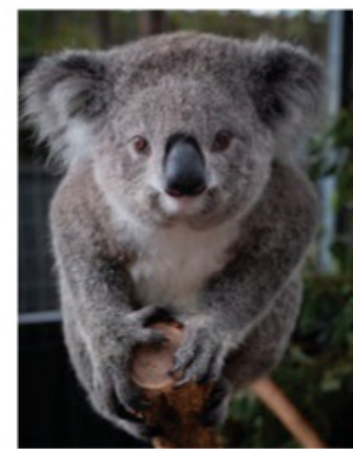


▲ **Visitors** to the koala hospital are able to watch the care and attention given to koalas. Here, an admission is checked by clinical director Cheyne Flanagan (at right) and Scott Castle, assistant clinical director, and volunteer Susanne Schueter.

While the koala was not on any of these lists, the species quickly became the symbol of all that precious and largely unique Australian biodiversity being pushed very close to the edge by the fires. Heart-wrenching social media footage went viral of a quintessential teddy bear-like koala crying in pain as a woman rescued it from a charred and smouldering forest on the NSW north coast, literally giving up her shirt to wrap around its badly burnt body. Later, from the Cooma area, south of Canberra, came reports of screaming koalas falling like fireballs from burning trees.

The focus of attention for a massive outpouring of grief, both nationally and internationally, for Australia's native animals quickly became the Port Macquarie Koala Hospital, a facility set up in 1973 as Australia's first wildlife hospital and now staffed by more than 150 volunteers. The first koala burns victim from the recent tragedy was Paul, who was brought in on 2 November, after which the hospital became a frenetic hub of activity for at least the next 12 weeks.

November is normally quiet for the hospital, but 50,000 people filed through its gates that month after the first images of Paul went around the world. And what they witnessed ►



Koala facts



Scientific name:
Phascolarctos cinereus

Common name: koala is an Indigenous word meaning "no water"

Drinking: it used to be thought koalas don't actively drink, getting enough moisture from the leaves they eat. It's now known they *do* drink and can suffer severely from dehydration during drought and heatwaves if they don't get enough water.

Main threats: habitat destruction and fragmentation (an estimated 80 per cent of the species' habitat has been lost since European colonisation); the sexually transmitted bacterial disease chlamydia; dog attacks; collisions with cars; climate change.

Conservation status: listed since 2012 as vulnerable to extinction in Queensland, NSW and the ACT; NSW was thought, before the bush-fires, to have lost 25 per cent of its koalas during the past two decades.

Distribution: eucalypt forests and woodlands of mainland south and eastern Australia.

Diet: the leaves of eucalypts and a few other related species such as melaleuca; an adult can eat more than 500g of leaves a day; they are thought to eat only about 20 of the roughly 700 eucalypt species in Australia.

Size and appearance: Queensland koalas are smaller, have lighter-coloured and less fur than koalas in the other states; Queensland adult females weigh 5–6kg, males 6–8kg; Victoria's adult females average 8.5kg, males 12kg.

► **Two supplements are** used to rehydrate and build the strength of admissions to the hospital: one is a type of milk formula mixed with pumpkin and corn; the other is liquefied gum leaves.

▼ **Rough pads on the** palms of koala paws help with gripping tree trunks and branches. Koalas and primates are the only animals known to have human-like fingerprints, with whorls and ridges. This paw has been burnt.



“We’re going to mimic what will happen in the wild and we’ll do that following strict scientific protocols and methodology.”

of trained carers. On average, koalas remain at the hospital for a month before being returned to the wild, as close as possible to where they were found.

Deaths of koalas in the northern NSW area as a direct result of the fires are said to be in their thousands, leaving what Cheyne will only describe, until full scientific surveys have been completed, as “a very small percentage” of the original northern NSW population. There is, however, an extraordinarily positive outcome that’s come out of the devastation. All the publicity has meant that the koala hospital has raised more than \$7 million on a GoFundMe page set up to handle the overwhelming level of donations that were besieging hospital volunteers. And that means the hospital is now able to embark on a wild koala breeding program, which it has had in the planning for several years. “The hospital is partnering with the University of Sydney, Australian Museum, Taronga Zoo, Billabong Zoo and the NSW government to get this happening,” explains Cheyne, who’s been a major force behind the project. Infrastructure for the program is expected to start before the end of the year.

“We’re going to mimic what will happen in the wild and we’ll do that following strict scientific protocols and methodology,” Cheyne says. “There will be three breeding facilities, separate from each as insurance in case of bushfires and the whole program will follow a ‘studbook’ system. Koalas will only be mated with koalas of the same provenance to maintain good genetic integrity. All offspring will be returned to the wild into well-managed, conserved habitats.” Rebuilding and retaining the number of animals living in this area is seen as ►

through the hospital treatment room’s public viewing window was a “conveyor belt” of burnt koalas, says clinical director Cheyne Flanagan. They also saw burned kangaroos, possums and turtles coming through as an overwhelmed FAWNA, a wildlife rescue facility on the NSW mid-north coast, also sent animals the hospital’s way.

Daily visitor numbers continued to be up by 50–75 per cent for the hospital over the following months, about a quarter of which were from overseas, says Sue Ashton, president of both the hospital and Koala Conservation Australia. During the crisis, followers on the hospital’s Facebook site rose from 27,000 to 150,000. The hospital offers koala “adoptions” at \$60 each to help raise funds and usually does no more than 300 a month. From 30 October to mid-January it processed 70,000. At the time of going to press it was still handling 1500 a day. “Every time a film crew comes here, and we’ve had them from around the world since the fires began, the adoptions roll in shortly after from wherever they came from – Japan, China, London, Saudi Arabia,” Sue says.

About 70 animals are cared for at the facility at any one time and its enclosures have been fully occupied since the fires began. Many koala joeys and quite a few older animals requiring specialist attention have also been cared for at the homes



During her two decades as a volunteer at the koala hospital, Barbara Barrett has helped rear dozens of injured animals back to health, with most successfully released into the wild.

► **Like all koala** researchers, Dr Valentina Mella and her team are careful to release koalas back to exactly the same tree in which they were found, taking precise GPS coordinates to ensure they do.

▼ **Geneticist Dr Rebecca** Johnson has been thrilled to see the landmark koala genome, which she headed, already being put to good use for the purposes of koala conservation.



Research based on the genome's findings has identified which koala populations would be the best to maintain to safeguard the species.

hugely important. Along with koalas in the Blue Mountains, which have also lost much of their habitat from these fires, the northern NSW and south-eastern Queensland koala populations are seen as particularly important to the survival of the species. And the reason why is that research has shown they are the country's most genetically diverse.

THE REALISATION ABOUT THE genetic significance of the northern NSW and Queensland populations grew out of the koala genome project, which for the first time detailed the species' genetic makeup. This huge undertaking, completed in mid-2018, was spearheaded by Dr Rebecca Johnson, director of the Australian Museum Research Institute, and involved collaboration from a large number of genetics and koala researchers from a wide range of research bodies.

Field researchers and wildlife carers, including those at the koala hospital, have been arguing that the conservation status of koalas should be upgraded from vulnerable, which is currently its status across much of the species range, to endangered. This would provide a higher legal level of protection for known koala habitat.

But there has been a problem of perception. Koalas are plentiful in Victoria and SA. "But quantity does not mean quality,"

Rebecca says. "All the animals in SA and a lot in Victoria are inbred. So they're not the ideal populations you'd want to use to rescue the species if it reached a highly endangered, about-to-go-extinct scenario." And what the current bushfire crisis has revealed is that we certainly need to prepare for the possibility of a natural disaster bringing on exactly that sort of scenario with a woodland and forest species such as the koala.

Research based on the genome's findings has identified which koala populations would be the best to maintain to safeguard the species. "And it's those populations around south-eastern Queensland, Port Macquarie and Coffs Harbour – all of those southern Queensland and northern coastal NSW populations – that are really diverse," Rebecca says. And those are exactly the populations that have been decimated by the recent fires.

Some of the 26,000 genes identified in the koala genome project also help explain the koala's extraordinary ability to survive almost exclusively on eucalypt leaves, a diet high in toxic terpenes and phenols. Researchers found an abundance of genes for bitter taste receptors, which would allow koalas to identify the least toxic leaves, as well as genes that could detoxify the poisonous substances. "So they have this super detox capability that allows them to eat a highly toxic diet," Rebecca explains.

Koalas are fussy eaters and different populations prefer the leaves of different eucalypt species. Many Victorian populations, for example, love manna gums. Different northern NSW populations choose a wider variety of eucalypt species from swamp and grey gums to tallowwood. Different genetic capabilities in



► **Sydney University researchers tag and microchip** Liverpool Plains koalas they have been recruiting to a long-term study of the effects of climate change on the species. Captured animals usually take a few moments to orient themselves after release back to the wild, before scampering up a tree.



▲ **Researchers can estimate** a koala's age by the level of wear on its teeth. This one (top) is less than seven years old. Long sharp claws and front paws that each have two opposable thumbs, allow koalas to move around trees with great dexterity.

populations, to deal with specific eucalypt toxins, could help explain that. This also may explain why it's proved to be so important for researchers and carers to return a koala to the same area, and preferably the same tree, from which it came.

BEYOND NATURAL DISASTERS, koalas face a long list of other threats. The negative impact of habitat clearing is ubiquitous across the country as it is for so many other species. But the other major threats differ in different areas. Domestic dog attacks and impacts with cars are huge problems for koalas living near urban or developed areas, as many northern NSW and southern Queensland populations do.

The sexually transmitted bacterial disease chlamydia, however, is the biggest problem for many koala populations right across the species' range. In northern NSW, for example, it's considered the biggest day-to-day threat to the species. There are many strains of chlamydia in many different mammals throughout the world. It's likely the koala is affected by its own strain but has evolved to deal with it over millennia. But the form of chlamydia causing widespread infertility and death in koalas right across their range now is almost identical to what's seen in livestock. And it's thought the original form entered the koala

population when pigs, cattle and sheep were brought to Australia by European settlers during the early 1800s. How the bacteria crossed over into the koala population, bearing in mind it's a sexually transmitted disease that affects mucous membranes, is unclear. No-one really knows, but ticks may have functioned as a kind of intermediary vector. However it arrived, koalas don't seem to have much natural ability to deal with it.

Chlamydia is often rampant in drought-stressed populations. "Drought reduces the available moisture in eucalypts for koalas who rely on this for their daily intake, so koalas become constantly dehydrated," Cheyne says. "Eucalypts have measures to protect their foliage in these conditions, so their leaves become more toxic and unpalatable. The koalas struggle to find available food and end up emaciated as well. All of this puts pressure on their immune system, so diseases such as chlamydia become expressed more. The result is very sick koalas that often end up in renal failure."

All animals brought to the hospital are examined using ultrasound and it's rare that an animal doesn't show signs of infection. Every animal that dies at the hospital, or is brought in dead, is also subjected to a post-mortem. This often reveals advanced chlamydia infection has played a role in the animal's demise. Antibiotics can kill or control the disease but koalas ►



Thick fur protects koalas from temperature extremes and also keeps them dry during rain. It varies in colour from light-grey to brown, northern koalas being lighter.

Many animals weakened by the drought have been succumbing to chlamydia and have been left sterile as a result.

► **Donated old white towels** are used in the koala hospital's enclosures to show whether treatments for chlamydia are being effective. Stains may be a sign the infection is still present.

are herbivores, with very long digestive tracts that rely on the actions of fermenting bacteria to function efficiently. Antibiotics can kill those useful bacteria as well as chlamydia.

A vaccine could help check the development of the disease, although its widespread use in wild populations could prove logistically challenging. Nevertheless, a team headed by Professor Peter Timms, a leading microbiologist at Queensland's University of the Sunshine Coast, has developed a vaccine that researchers from the University of Sydney were hoping to trial on a population of koalas on a private property on the Liverpool Plains, in western NSW.

That population has now been studied by animal behaviour expert Dr Valentina Mella for more than three years. Koalas breed between August and February depending on where they live. The Liverpool Plains population breeds towards the latter end of that period and Valentina was hoping to trial the new vaccine on the animals in April.

"But they're too weak because of the drought," she explains. "So we'll put it off for now. We don't want to put any more potential stresses on these animals."

This is the first breeding season, during the time Valentina has been studying the population, that she hasn't seen any babies. "It's heartbreaking," she says.

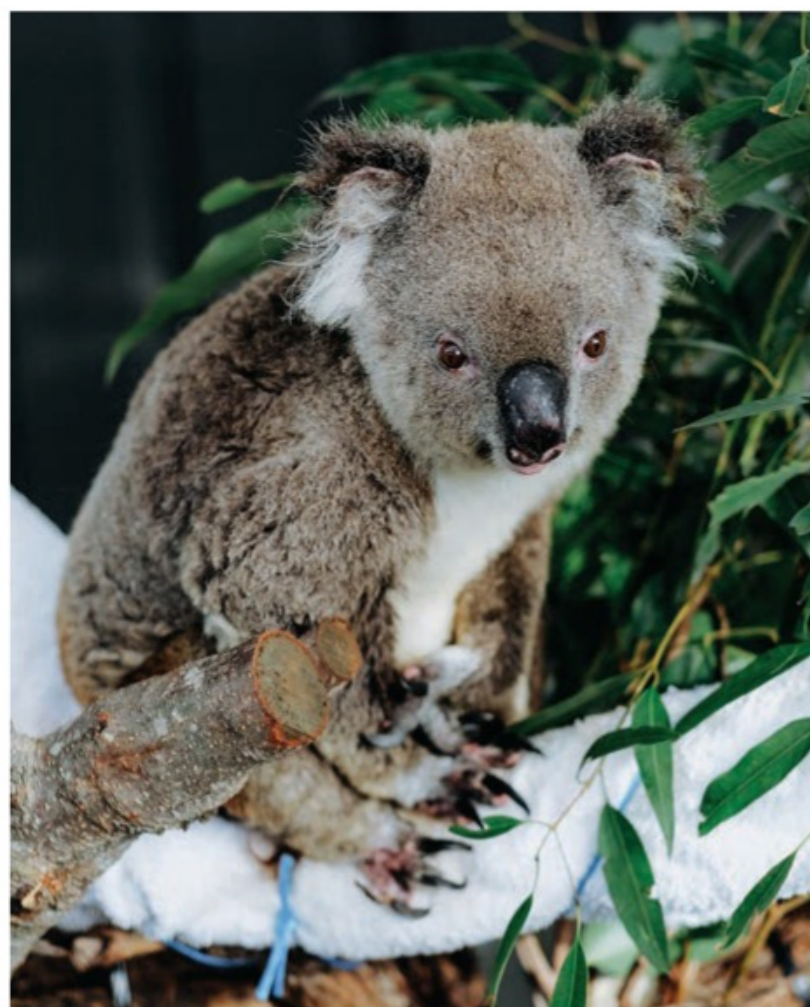
Her team's surveys have found that many animals weakened by the drought have been succumbing to chlamydia and have been left sterile as a result, explaining, at least partly, the lack of offspring in the population this season.

Valentina's research is helping to overturn one of the long-held beliefs about koalas – that they don't drink. She has a study underway looking at the use of water stations that property owner Robert Friend has designed. So far she's recorded a lot of activity at the stations, and not just by koalas but also possums, gliders and many native birds.

Valentina's team is also studying what sort of impact increasing temperatures will have on the physiology of koalas. Their body temperature runs at about 36°C, slightly less than humans, but they can cope with wider fluctuations than we can. How much that internal temperature rises and falls in response to the surrounding ambient temperature is being assessed by the use of tiny, harmless pills that contain microelectronics administered to koalas caught for the study.

These are passed by the animals with no ill effect after about a week, but transmit useful internal body temperature readings via Bluetooth while ingested.

The concern is that if the koala's internal temperature rises too much in response to ongoing high temperatures in the environment than the enzymes on which so many of their normal bodily activities rely, such as digestion, will be affected.



ECOLOGISTS JOKE THAT it's easy to get money to study koalas because they're so universally loved by the general public. Part of the reason why is because they have many features of an 18-month-old toddler, from their forward-facing eyes to the proportions of their limbs. Whatever the reason for the overwhelming love of humans for koalas, the worldwide reaction to their plight during the fires is clear testament to that.

Cheyne, with the support of Sue, at the koala hospital plans to continue riding this strong wave of sentiment as much as possible.

"We've been invited to be part of the UN World Environment Day in New York in March on the impacts of Global Warming: wildfires on wildlife," Cheyne says. "Representatives from the IUCN will be in attendance and we're hoping to engage them in making changes to the conservation status of the koala." She also hopes to be able to exploit some deep philanthropic pockets while in the USA and attract funds of \$100 million for the koala hospital to be able to buy large tracts of land in Australia of prime koala habitat.

Meanwhile, many researchers in ecology and conservation hope to also ride that huge wave of love for koalas, realising that protecting koala habitat also brings with it many more species sharing that habitat, from other mammals to reptiles, insects and plants. And so the koala is now being hailed by many scientists as an important umbrella species, worthy of high-level protection regardless of its legal conservation status.

Professor Hugh Possingham, chief scientist of the international conservation not-for-profit The Nature Conservancy is among them.

"Koalas, like many other species, prefer fertile moist habitats that are good for agriculture and cities," he says. "And there are many other wonderful species in those locations that most people know nothing about; many species that will also benefit by protecting koala habitat."

"The plight of the koala is like the tip of the iceberg; it represents the plight of a thousand species that are suffering just as much from habitat loss and fire."

AG



Dense woodland once flanked the iconic road journey to Cape du Couedic in Flinders Chase NP. This vista from Bunker Hill reveals the desolation inflicted by the fiercest inferno in the six weeks of fires that ravaged Kangaroo Island.



2019/2020 BUSHFIRE CRISIS

THIS ISLAND'S LIFE

A relentlessly destructive summer of bushfires has broken the hearts of the people of South Australia's Kangaroo Island, but not their spirit.



STORY AND
PHOTOGRAPHY
BY QUENTIN CHESTER



The 3 January firestorm raged along the island's south coast, devastating farms, homes and vital tourism accommodation, including Southern Ocean Lodge and the Wilderness Retreat.



▲ **Miraculous survivor.** In a bid to sustain the remaining wild populations, park rangers are air-dropping food to animals in remote parts of Flinders Chase NP.



▲ **Normally hidden from view** by surrounding coastal mallee, great congregations of grass trees are now standing proud throughout the park.



KANGAROO ISLAND

Almost half of Kangaroo Island – 211,255ha, mostly in the west – has been razed by bushfires this summer. Two people died, 65 homes and hundreds of other buildings have been destroyed. Among the endangered wildlife species further imperilled are the KI glossy black-cockatoo and KI dunnart, a small marsupial endemic to the island.

VANTAGE POINTS were rare in Flinders Chase. The densely wooded tracks through Kangaroo Island's beloved national park gave little away. Drive south, however, and the road curves to a lookout atop Bunker Hill. This ancient dune crest was once a favourite spot to pull over at. Here, locals could recount a miracle of rebirth, the resurgence of an entire woodland realm following the December 2007 bushfires that tore through 85 per cent of the park.

On the last day of last year I stopped here with a German couple I was guiding around my island home. Under crisp blue skies we gazed across an undulating expanse of close-packed mallee scrub. This lavish sea of green growth dipped and rolled all the way to the coast. Perky blue wrens skittered at our feet as I shared the park's revival tale with my guests. Little did I know this would be my last such vision from Bunker Hill, at least for a decade or two.

Three days later a devastating inferno roared south through Flinders Chase National Park. Branded the 'Ravine Fire', it moved with a speed and ferocity much greater than the 2007 blaze. Just weeks earlier, islanders had celebrated the park's centenary and the pioneering field naturalists who'd fought for nearly three decades for its creation. More than just a refuge for plants and animals, 'The Chase' was cherished as a bastion of the woodland diversity and vigour long lost from mainland South Australia. In six brutal hours this priceless natural enclave was transformed into a charnel house of sticks, ash and blackened bones.

The Ravine Fire was not the end of our island's woes; nor was it the beginning. At the onset of summer, and after two years of below-average rainfall, the island's farms and bushland were perilously dry. A mid-December hot spell ended on the afternoon of 20 December. It was a stifling day of 42°C heat with bushfires charging through the Adelaide Hills.

By mid-afternoon a dry lightning storm was blitzing Kangaroo Island ahead of the change. Within an hour the Country Fire Service (CFS) website was showing a dozen or so separate grass fires flaring up across the island. Anxious about our fate, I closed the laptop and drove up Cape Willoughby Road to keep a lookout for lightning strikes and smoke and passed a neighbour returning from the same mission. Mercifully, the only fire on the Dudley Peninsula, at the island's eastern end, was quickly doused by the Penneshaw fire crew.

However, further west a crisis was unfolding. The cool change brought punchy southerly winds gusting to 80km/h. By late afternoon, fires were raging along heavily timbered ridgelines and valleys that drop steeply to the island's north coast. As the Christmas Pageant trundled through Kingscote beneath an eerie smoke-streaked sky, the red CFS emergency warning zone was extended to span 80km of the island's northern hinterland.

This expanse includes some of the steepest and most inaccessible terrain in the state, none more so than at Western River. By nightfall the fires had descended onto the homestead nestled at the base of the valley where Caroline Taylor, a good friend, was home alone. With little phone reception she turned to a Facebook group for help: "Fire all around the house: inside garden. Hills both sides ablaze. Smoke everywhere. Too dangerous for spot watering but what do I do???" After two tense hours she was courageously rescued, along with four backpackers from the nearby cove, by local CFS Captain Michael Swaine.

FOR A SMALL community scattered across 4500sq.km, Facebook became the indispensable lifeline for information and news of friends during the following weeks. The go-to page was *The Islander*, where Stan Gorton, our local newspaper's indefatigable editor, shared CFS ►



alerts, along with a steady stream of timely updates from the field. Every day, new stories surfaced of lucky escapes and grim losses, along with images from the fireground of volunteer crews and farm units doing their utmost.

Through the last week of December the initial fires continued to burn, though mostly within containment lines. Then on 30 December I was woken just before dawn by lightning. Once again, I took to the road to keep watch. And many neighbours did the same, as I later learnt. Thankfully, the storm swept south out to sea, but not before it had sparked new fires on the island's far western flanks, including two outbreaks deep within the remote Ravine des Casoars section of Flinders Chase.

By 2 January these fires had roiled into dense bush to the north and west, and the CFS shared grave concerns about the volatile conditions to come. Our worst fears were realised late next morning when the two Ravine blazes merged. Driven by stiff north-easterly winds, the

Even from 40km away the scale of the unfolding catastrophe was writ large across the western sky.

massive fire front pushed south into Flinders Chase. It soon overwhelmed the park's fire crews and charged onwards to the coast at Remarkable Rocks.

I was working at Seal Bay Conservation Park that day. Even from 40km away the scale of the unfolding catastrophe was writ large across the western sky. A pyrocumulus cloud towered nearly 18km upwards. The smoke plume stretched 70km out to sea. At 3pm we evacuated the park. The sun was streaming into the bay where sea lion pups splashed in the shallows. As I ushered the last visitors up



◀ **The deep ravine of** Western River Cove was among the first areas engulfed by fire on the island's north coast. Repeated outbreaks over many days also affected neighbouring communities in Middle River and Stokes Bay.

▼ **The bursting of these** vivid hakea seed pods in Flinders Chase underscore the adaptation of many species to fire events.



the boardwalk, many were still wanting selfies and seemed oblivious to what was happening, as if the smoky pall hugging the horizon was nothing out of the ordinary.

With each passing hour that evening, the news grew more dire. As the winds swung to the west and south-west, they gathered strength, shunting the fires along the south coast and eastward towards Parndana in the heart of the island. By 9.30pm the Emergency Services control centre was evacuating to the town of Kingscote and the entire island was now either under an Emergency or Watch And Act warning. It was another unnerving night of knowing too much and yet not enough.

At some point the warnings and updates became a blur. So too the picturing of places, farms and people in the fire's path; all the homes, nest sites and hand-hewn cabins; the bush-fringed bays, the hidden streams and our sentinel trees where we looked for koalas and cockatoos; and so many dear friends living close with their animals, be they

nature's mobs or tended flocks. All of it swept into a chaos beyond comprehension.

IN THE FOLLOWING days the punishing toll of this horrific fire was revealed. Most tragic was the loss of legendary bush pilot Dick Lang and his son, Clayton, who died trying to return to their property after two days fighting a nearby fire. Across the island the physical destruction was overwhelming: Southern Ocean Lodge, Hanson Bay Sanctuary, Kangaroo Island Wilderness Retreat, the visitor and heritage buildings at Flinders Chase – all gone. It wasn't just the loss of the structures; they were symbolic gateways to a cherished natural kingdom that now lay in ruins.

Through the island's heartlands, many farm families suffered the destruction of multiple houses and much of their livestock. A friend told me his neighbour lost nearly 5000 ewes in 10 minutes. For most farmers, these flocks represented careful breeding programs spanning decades. ►



▲ Across all the island's firegrounds, the remarkable post-fire resurgence of the local yaccas, or grass trees – *Xanthorrhoea semiplana* *tateana* – are striking emblems of recovery.

Elsewhere, thousands of hectares of plantation forest were burnt, vineyards wiped out and scores of beehives destroyed.

As if this wasn't distressing enough, all through January fires kept breaking control lines, surging with the island's mercurial winds. It was yet another hot, ominous, blustery day on 9 January. By mid-afternoon fires had flared around Parndana and Vivonne Bay on the south coast. Then, near sundown, the wind swung and raged across the island from the south-west, driving multiple fire fronts eastwards. Smoke and falling ash streamed east to Cape Willoughby. By midnight Kingscote was under an emergency warning. Frantic residents and evacuees, many gathered at the town wharf, faced the unthinkable as the fire's shocking spectral glow loomed in the western sky.

Then, in the early hours of the morning, the rain came. Not much, but enough to help subdue the flames and calm the mood. So many stories from that long, sleepless night – and all the other dirty nights and days the island had endured this past summer.

No slick summary can properly give voice to the heart-break and collective grief, the grit and big-hearted community courage of these weeks.

But if there's a bottom line it's that we're still here and we'll come back from this.

There were faint hints of renewal; ancient grass trees standing shoulder to shoulder... with a spurt of green growth.

ISLANDERS ARE STUBBORNLY self-reliant folk. That's always been the way. It's their knack for surviving without much in the way of back-up from afar. But this summer was different. So many mainland fireys came to join the fight, then the army too, and ferry-loads of mates and strangers with food and other gear, plus all sorts of bods to help us put up fences and rescue the roos and koalas.

In their own way the waves of goodwill and generosity from around the world were overwhelming. Maybe it's because we're an island and people feel for our isolation. But perhaps it's also something about how the place quietly managed to juggle its farming with caring for nature and looking after visitors.

Along with the island's stirring wildness there has always been a bit of outback makeshift spirit here that travellers warmed to.

A couple of weeks after Flinders Chase was burnt out, my wife, Dale, and I took a drive through the park. Over the years it had become a big part of our lives, a place chock-full of discoveries, epic weather, wildlife encounters and deep-layered memories.

The initial shock as we passed through once mighty stands of sugar gum, now lying charred and broken, was almost too much to bear.

Down at Remarkable Rocks, one of the island's most recognisable landmarks, the boardwalk was gone, the tight weave of scrub incinerated. The heat of the blaze had shattered the very granite itself at the base of the rocks. Up top, animal scats were littered across the surface from where roos, wallabies and birds had frantically sought shelter among the monoliths as the inferno engulfed the coast. Yet nearby there were signs of life: scrubwrens chattering in the burnt-out mallee skeletons with fresh tufts of red growth sprouting from their base.

On the way back from the coast we paused atop Bunker Hill. A gusty breeze was blowing spumes of powdery white ash across the road. As we gazed south, the landscape was more like snow drifts on the Bogong High Plains than the Flinders Chase we knew and loved.

But here too in the distance there were faint hints of renewal; ancient grass trees standing shoulder to shoulder – iconic survivors giving the next miracle a nudge with a spurt of green growth.

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In the face of Kangaroo Island's most extreme fires in living memory, the captivating granite formations at Remarkable Rocks held fast atop the wild southern shores of Flinders Chase NP.



Into the far west

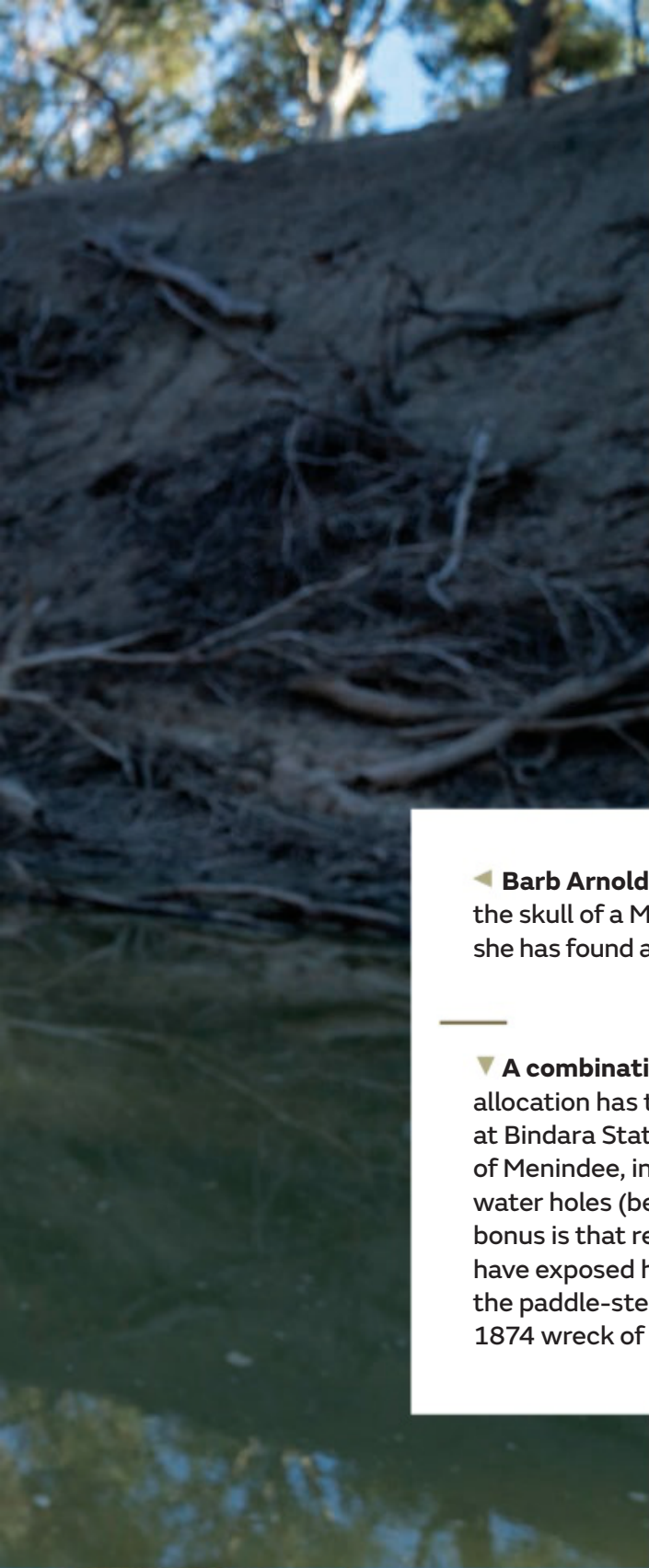
The tough characters and vast, dry landscapes of outback New South Wales make for a true blue Aussie adventure, so don your akubra, pack your car and hit the long, dusty road.

STORY BY TIM THE YOWIE MAN
PHOTOGRAPHY BY ANDREW GREGORY

Kinchega Woolshed is one of many heritage-listed cultural and natural treasures in this region of outback NSW.







THE SHADOWS of giant 400-year-old gum trees lengthen, backed by a fading burnt-orange sky. A flock of raucous red-tailed black-cockatoos squabble over roosts. And Australia's second longest river meanders into the distance.

◀ **Barb Arnold** of Bindara Station holds the skull of a Murray cod, one of many she has found along the dry Darling River.

▼ **A combination of** drought and water allocation has turned the Darling River at Bindara Station, downstream of Menindee, into a series of shallow water holes (below left). One small bonus is that record low water levels have exposed historical treasures from the paddle-steamer era including the 1874 wreck of PS Rodney (below).



It's another stunning sunset on the banks of the Darling River. But one essential ingredient is missing. Water.

"I've never seen it this low," says Barb Arnold of Bindara Station, located midway between Menindee and Pooncarie in western New South Wales, her home for the last four decades.

Low is an understatement. Upstream, but for a couple of Murray cod floundering in fast-evaporating shallow pools, the otherwise dusty riverbed is strewn with the desiccated shells of dead mussels. Downstream it's even more dire. Historic wrecks of paddle-steamers are exposed, their fragile wooden hulls protruding eerily, like giant whale carcasses, out of the mud.

With no feed and no water, Barb, whose husband Bill passed away six years ago, was forced last year to sell her remaining cattle, a herd of Devon-based Shorthorn cross that the couple had been breeding for 39 years. It was heartbreaking.

Unlike many other drought-stricken farmers, Barb has a lifeline – a steady stream of weary travellers bunking down in Bindara's converted drovers' and shearers' quarters.

"Locals initially thought we were a bit strange when we first set up the farmstay and the neighbours were worried some guests might steal a sheep or cow and take it back to the city," Barb says while busily preparing our camp dinner. "However, without it, I'd be stuffed now. I'd be relying on handouts and how demoralising would that be?"

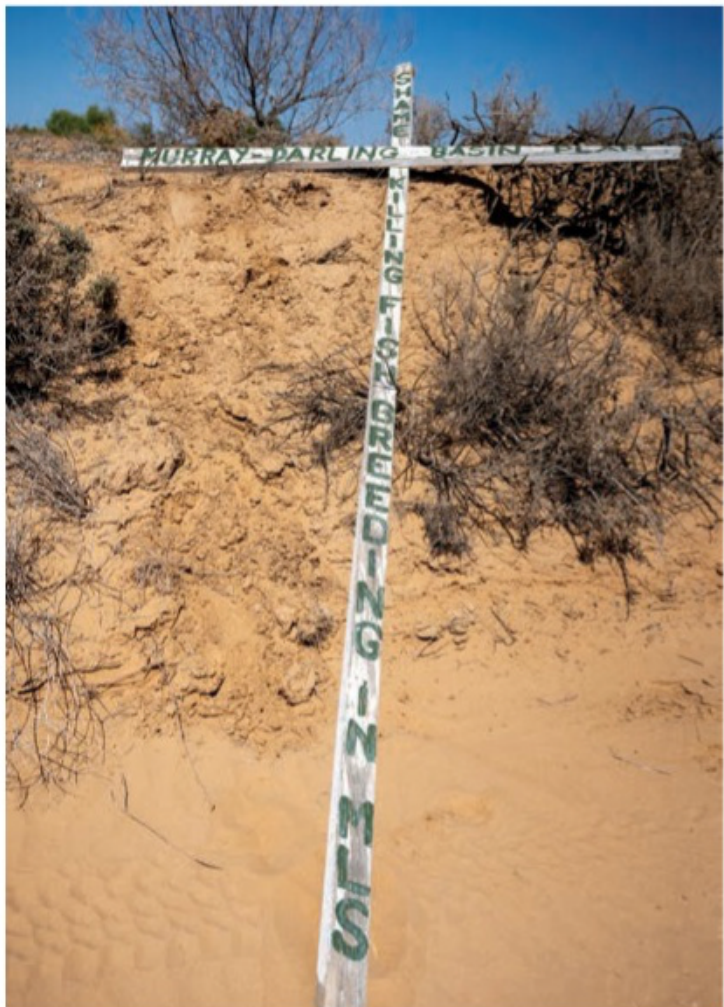
Overnight visitors are enamoured of Barb's legendary hospitality, and her property's absolute river frontage entices most to paddle or fish. Without water, you'd think Barb would be at her wit's end. But with that matter-of-fact 'she'll-be-right' optimism that seems to abound west of the Great Dividing Range, she has viewed the current water crisis as an opportunity rather than a crisis. I guess she's had little choice.

"Years ago when I visited Uluru it was raining cats and dogs, and at first I was upset. But then I realised 'Wow, how often does it flood at Uluru, hardly ever, this is quite special,'" she recalls. "Similarly, now you can experience the Darling [river] dried up. It's a once-in-a-lifetime experience too."

In a way, she's right. Exploring the dry riverbed is a (hopefully) rare opportunity to fossick through a priceless treasure chest of natural and cultural history.

"The Burke and Wills entourage camped near here in 1860, drying beef before attempting their epic journey north," Barb explains the next morning, as we scramble down the steep, sandy riverbank, and traipse along its parched bed. ►

► **Broken dreams:** these weekenders, some with jetties, most built in the 1960s for Broken Hill miners, have temporarily lost their waterfront views. Instead, they look out over a dry Lake Menindee.



▲ **Large protest crosses** decrying the Murray-Darling Basin management plan and hammered into dunes above Lake Menindee have become tourist attractions.



The Wilcannia Court House is one of several restored Victorian-era sandstone buildings in the town located 200km north-east of Broken Hill on the Barrier Highway.

“I recently found a boomerang here, a dinky-di one used to kill an animal, maybe a duck. It’d been in the river for who knows how long,” Barb says, as we approach a sweeping bend in the river where in the late 1800s paddle-steamers would load up with wool bales.

Gazing up from the bottom of the river channel, 10m deep in parts, provides an especially unusual perspective of the ancient river red gums that cling precariously to the banks, their roots dangling like giant octopus tentacles in search of water. Sadly, it seems, all they’ve caught recently are dust-encrusted tumbleweeds. Some of the bigger trees feature historic European survey marks from the 1800s but others wear much older cultural scars – bark carved out by Aboriginal people to make travelling canoes or bowls.

There’s even a tree with a carefully carved letterbox-sized slit at eye level. “Oh, that’s the postman’s tree,” Barb explains. “Back in the 1880s, a shearer was receiving illicit mail, so he asked the riverboat captain if he wouldn’t mind stopping to drop his mail in the hole in the tree.”

Barb then reflects more seriously as she turns her attention to the lack of water in the Menindee Lakes, a chain of shallow, ephemeral freshwater lakes connected upstream to the Darling River to form an artificial storage system. “I can get used to a flood or drought in the paddocks, but I can’t get used to no water coming down the river; it just doesn’t seem right.”

Menindee

A two-hour drive up the dusty track, dodging feral goats, to Menindee reveals that Barb isn’t the only one unhappy with management of water flows along the Darling. Just about everywhere you look there are not-so-subtle signs criticising the allocation of water.

Stickers on cars and cash registers in shops scream “Return Water to the River: SAVE THE DARLING”, referring to the drought in the upper Darling. Meanwhile, a collection of large white crosses stand forlornly atop a rise looking over the town’s weir with slogans demanding “water equality for the river and the lakes”.

Nowhere is the effect of the lack of water more stark than at Sunset Strip, about 20km out of Menindee where, in the 1960s, Broken Hill miners built weekenders with waterfront views on the shores of Lake Menindee. When the lake is full it’s a magnet for powerboaters, waterskiers and fishers. But during a drought, the boats, like the dreams of their owners, are left high and dry.

Wilcannia

Further upriver at Wilcannia, a bustling river port in the late 1800s, some of the Barkindji, who make up the majority of the town’s population of 600, have turned to dance in a desperate attempt to make the Darling flow again. As we arrive in town, the usually unrelentingly blue sky gives way to dark clouds.



Uncle Owen Whyman, a Barkindji man, examines a contemporary scar tree that will feature as part of a cultural tour he's launching later this year to showcase Wilcannia's Aboriginal and European history.

“Oh, you’ve brought some rain with you,” says Uncle Owen Whyman, a Barkindji man who has been leading a series of corroborees “to sing up some rain”.

He looks expectantly skyward as he explains: “The river, that’s where our stories lie. Without the river, there’s no us.” The dark sky turns out to be false hope as a brief shower, a few drops at best, all but evaporates before it hits the ground.

Despite the troubling state of the Darling, Wilcannia is a town on the up. There’s no denying this river town has had its fair share of social unrest in recent decades. However, Wilcannia is no longer a place to drive through with the doors locked and windows wound up, as media reports once famously suggested you should do. Now the locals have too much to tell you.

One man leading this charge is Andrew Stacey, an artist from Gippsland who moved here three years ago to lovingly refurbish one of the town’s Victorian-era stone buildings, the 1877 sandstone Queens Head Hotel, into an art gallery-come-community hub.

“Wilcannia has a murky history of exclusion and racism, but we are trying to put that behind us,” he says, pointing to recent hand prints of Aboriginal kids plastered lovingly on the gallery walls.

Owen hopes to tap into Wilcannia’s renaissance by launching a tour business that showcases both the town’s European and

Indigenous heritage. “All our stories are based around the river, which we Barkindji people call the Barka,” he explains, as he gives us a sneak peek of his planned tour, including a visit to several sacred sites.

“Look, this scar is quite recent, done 30 years ago when I was at school to give us kids a connection to country,” he says. “Now I’m hoping to get the next generation to carve their own scars in the trees.”

By inviting travellers into his community and sharing with them his people’s special stories, Owen hopes non-Indigenous people will develop a better understanding of his “land and his people”.

Mutawintji National Park

If Owen is to find a successful model for Aboriginal tourism he need only look 200km up the road to Mutawintji National Park.

It’s home to rich ochre resources and is the last wild refuge in NSW for the endangered yellow-footed rock-wallaby. But it’s best known for its rock engravings and hand stencils.

After priceless engravings were pilfered by thieves last century, the park is now owned and managed by the Barkindji and the only way to access the main heritage site, wedged in a hidden gorge ringed by rust-coloured ridges, is with a local guide.

“I was taught about plants, trees, animals and birds before I could count to 10,” says Keanu Garni Bates, Continued page 81 ►

OUTBACK NSW



THE ROUTE in this story follows roads between the towns of Broken Hill, Wilcannia, Menindee and White Cliffs, and Mutawintji National Park. Bindara Station is south of Menindee on the Darling River.

1 MAIDENS HOTEL: Burke and Wills visited this Menindee hotel on 14 October 1860 on their ill-fated journey from Melbourne to the Gulf of Carpentaria.

2 BURKE AND WILLS CAMPSITE: When the expedition reached Menindee, the deputy leader George Landells resigned. On 19 October 1860, Burke split the party, heading north to Cooper Creek with half the men, stores and animals. Those left made a depot camp on Pamamaroo Creek for a year. It's near the weir on the lake's south-east side.

3 MENINDEE INLET WEIR: From this high point, just off Menindee Road at Copi Hollow, you can see the expanse of Lake Menindee (either empty or full) and giant crosses that have been placed by protesters against the allocation of water to users along the Darling River.



4 SUNSET STRIP: This is the rather romantic name given to 'waterfront' homes in the area of Lakeview and Kingfisher avenues, on the northern shores of Lake Menindee, about 20km by road north-west of town. There are about 120 weekenders here.

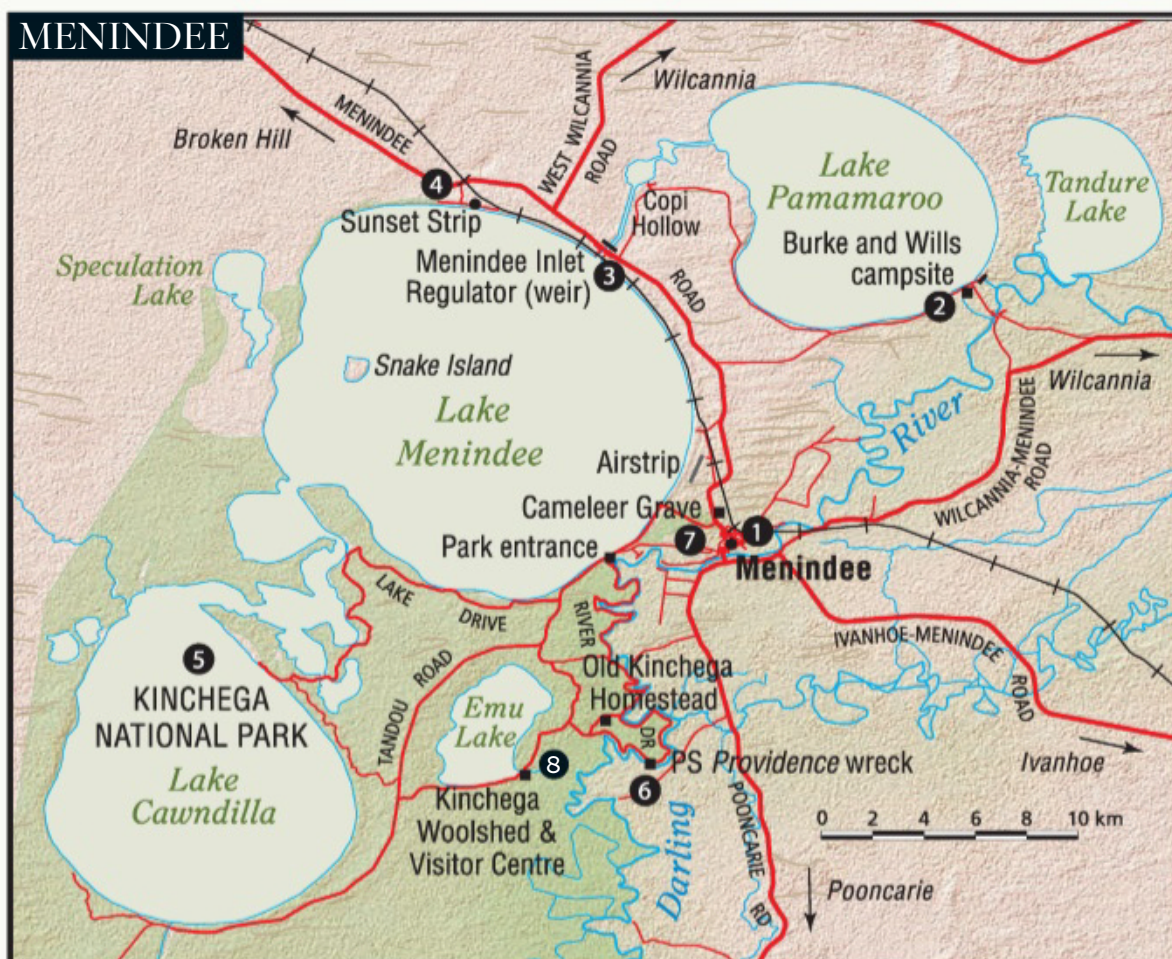
5 KINCHEGA NATIONAL PARK: Camp beside the Darling River among the majestic river red gums of this 44,000ha park. Short walks lead to historic homestead ruins, scar trees and middens.

6 PS PROVIDENCE WRECK: In 1872 the boiler on the riverboat *PS Providence* exploded, killing all but one on board. The explosion was so loud it was heard in the Kinchega Woolshed kilometres away, and was so powerful that it reportedly ejected the ship's cook up into a tree.

7 CAMELEER GRAVE: This is the final resting place of a camel handler on the Burke and Wills expedition, Dost Mahomet, had his arm ripped off by a bull camel near Innamincka and was sent back to Menindee, where he became a baker.



8 KINCHEGA WOOLSHED: Built in 1875 from corrugated iron and river red gum, the woolshed is a well-preserved piece of Australian pastoral heritage: more than 6 million sheep were sheared here during its 97-year history.

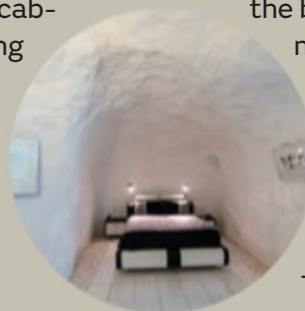


OUTBACK BEDS

Outback NSW has many camping grounds suitable for tents or motorhomes. These sites offer cabins.

Bindara Station: These converted drovers' and shearers' quarters on the Darling's western banks, between Menindee and Pooncarie, offer great outback hospitality. You can also stay as a volunteer helper. bindarastation.com

Wilcannia: Warrawong on the Darling has self-contained cabins on a billabong near town. Don't miss the exposed geological reef on a river bend and the river red gum with rope marks where paddle-steamers tied up in the 1800s. facebook.com/warrawongonthedarling



▼ **White Cliffs:** The Underground Motel is on the bucket list for many. Closed Nov–Apr. undergroundmotel.com.au

Broken Hill: The Broken Hill Outback Resort, just out of town in the restored Mt Gipps Hotel, is a great base for day trips. brokenhilloutbackresort.com.au



From the air, the remote opal-mining outpost of White Cliffs – with more than 50,000 mine shafts, most of which are long abandoned – resembles a moonscape.



A view inside White Cliff's aptly named White House – a chic underground mansion built in an old opal mine. Its tunnels, now hallways, are rendered and painted white.



▼ **There's no shortage** of raw materials with which to build a beer-bottle dwelling in White Cliffs. This one's a jewellery shop.



◀ **The only way to see the** ancient rock art and hand stencils at Mutawintji NP is with certified guides, such as Indigenous ranger Keanu Garni Bates.

“I was taught about plants, trees, animals and birds before I could count to 10.”

an Aboriginal ranger who, despite his youth, is viewed by his peers as an Elder.

“Barkindji people would meet in this valley for ceremony to learn about their Dreamtime stories before coming up here for initiation,” Keanu says as he leads us past dozens of rock engravings, each with their own significance.

“The river and landscape were created by Natji, the Dream-time rainbow serpent,” Keanu says, pointing to two water holes – the Natji’s footprints.

“After initiation they would leave their hand stencils in the caves on the other side of the valley.”

This display of stencils is one of the most impressive in the country and their main threat today is no longer art thieves but the outback’s proliferation of feral goats. Despite the installation of barriers, the goats rub against the cave walls, the oil on their skin causing the stencils to fade.

What makes Keanu’s tour particularly engaging isn’t only his detailed knowledge of local lore but also his understanding of natural history. He points out, for example, some fossilised droppings that are partially obscured above one rock overhang and explains that they belong to a stick-nest rat, a species that has been locally extinct for at least 100 years.

Before we leave, Keanu explains that some Wilcannia Barkindji people believe the Natji’s final resting place is at White Cliffs where its droppings are sacred and can’t be touched by some Barkindji people. “White people call them opals,” he adds.

White Cliffs

Given this revelation, it’s not surprising that the majority of White Cliffs’ 100 residents are non-Indigenous Australians – lifestylers lured by the prospect of digging up a chunk of precious crystal coal seam opal, first discovered here in the 1880s.

Colourful characters such as 55-year-old Rob Dyson, who stopped at the town’s caravan park with his wife Shirley, 10 years ago, and decided to stay.

Rob is now caretaker at the same van park and when not trying his luck on the opal fields he runs bus tours of White Cliffs in what appears to be one of the only registered vehicles in town.

Our first stop is a jewellery shop made entirely of beer bottles. “Sadly, all the bottles are empty,” Rob muses. ▶

► **Outback pilot** Randall Crozier and three motorcycle musterers, Joe Baty, James Hatch and Jack McGrath, take a break from rounding up goats between Wilcannia and White Cliffs.



▲ **To escape the heat**, most residents of White Cliffs, including Dick Wagner, opal miner come jewellery peddler, live in underground houses called dugouts, where the temperature is a constant 22°C.



Now accessible via a sealed road from Broken Hill, White Cliffs is experiencing a surge in travellers enjoying a voyeuristic peek at the quirky town.

It turns out to be one of the few buildings out here that is built above the ground.

“Almost everyone lives in dugouts where it’s a constant temperature of about 22 degrees – it’s much easier than having to run an air conditioner in each room all day,” Rob says.

A highlight of Rob’s show-and-tell is a snoop around the cavernous White House, a luxurious underground rabbit warren that would make Kevin McCloud, presenter of *Grand Designs*, a television architectural design program, salivate. Think New York apartment chic mixed with all the quirk of Tasmania’s Museum of Old and New Art...and all in an abandoned opal mine. Amazing.

Just down the hill, and past a few hundred abandoned mine shafts (there are more than 50,000) that, from the air, give the town a lunar landscape appearance, is a much more modest dwelling, home to 71-year-old Dick Wagner and Southern Cross Opals.

Dick is a bit of a legend in these parts, and for good reason. “Within an hour of buying a lease from another miner in 2000, Dick struck it rich, finding a seam of opal.

“It ran and it ran,” says Dick with a smile, professing he dug up “buckets full of opal”. So how did the previous miner owner react? “The first day I showed him he was happy for me, the second day he was still happy, but after the third day

he wouldn’t talk to me,” says Dick, laughing. “He knew he had gotten so close.”

But, like most of this outback outpost’s underground inhabitants, Dick’s luck soon turned, and since his opportunistic find he’s dug up next to nothing. Or, at least that’s what he’s telling everyone.

While Dick loves to romanticise about the days “when miners walked in from Wilcannia with a wheelbarrow, pick and shovel and a bit of tucker on board”, he admits that although it’s off the beaten track, White Cliffs isn’t quite the frontier country it once was.

“When the 75km road out from Wilcannia [Opal Miners Way] was unsealed, it was shocking – mile after mile of corrugations and bulldust,” Dick recalls. “But since it was sealed in 2009, visitors have started to increase.”

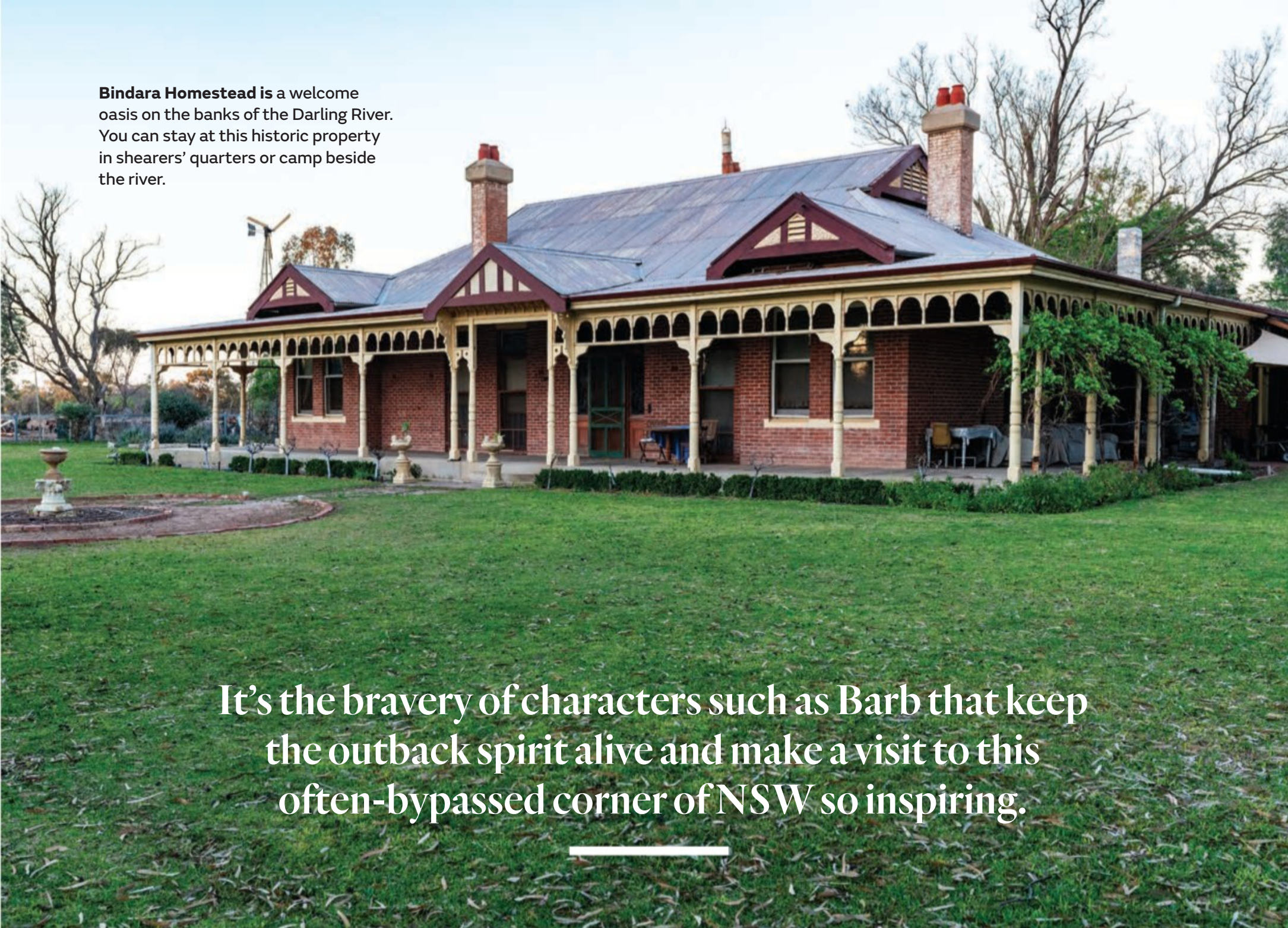
Another White Cliffs’ landmark to benefit from the sealed road is the town’s purpose-built Underground Motel where you can bunk down in your very own dugout for the night.

“Just be careful if you hear digging in the middle of the night,” Rob deadpans, referring to one miner’s failed attempts to make his lounge room bigger.

“He accidentally miscalculated his boundary and ended up, with pick in hand, in his neighbour’s bedroom.”

Apparently it is true.

Bindara Homestead is a welcome oasis on the banks of the Darling River. You can stay at this historic property in shearers' quarters or camp beside the river.



It's the bravery of characters such as Barb that keep the outback spirit alive and make a visit to this often-bypassed corner of NSW so inspiring.

On the road

Among the best things about exploring the NSW outback are the many unexpected sites – from isolated windmills to mirages of vast inland seas caused by heat haze – that you encounter while driving across the wide open plains.

On the road between White Cliffs and Wilcannia, while steering clear of yet more feral goats (which seem, more so than most large mammals, to thrive in the drought conditions), we spot a conspicuous yellow Foxbat Kelpie ultralight landing among a pall of dust in an unfenced paddock.

We drive over and hail down the pilot. It's Randall Crozier, formerly head stockman with beef producer S. Kidman & Co, where for many years he managed Anna Creek, the biggest working cattle station in the world. He's up for a yarn, and what's more he's able to shed some light on all the goats we've been avoiding on the road for the last few days.

"Now that the sheep are gone due to the drought, it's basically feral goats keeping the farmers afloat out here. I spot them from the air and then these blokes round them up," Randall explains, pointing to a motley crew of three dirt bikers speeding towards us.

According to Randall, the goats rounded up today will be trucked off to Hungerford, about 400km away, where they are processed and shipped all over the world.

Back to Bindara

After four days exploring outback NSW, we're drawn back to Bindara, and back to Barb Arnold.

As we huddle around the campfire, Barb explains that just before we arrived she'd tried to rescue an emu from one of the last puddles on her stretch of river.

"I took an old eiderdown down and wrapped it around it thinking it was going to kick and bite and carry on; but it was all bones and feathers," she says. "I gave it some food but it died. I think it was the last one."

There's a long silence as the flickering flames cast shadows like dancing spirits on the old river red gums.

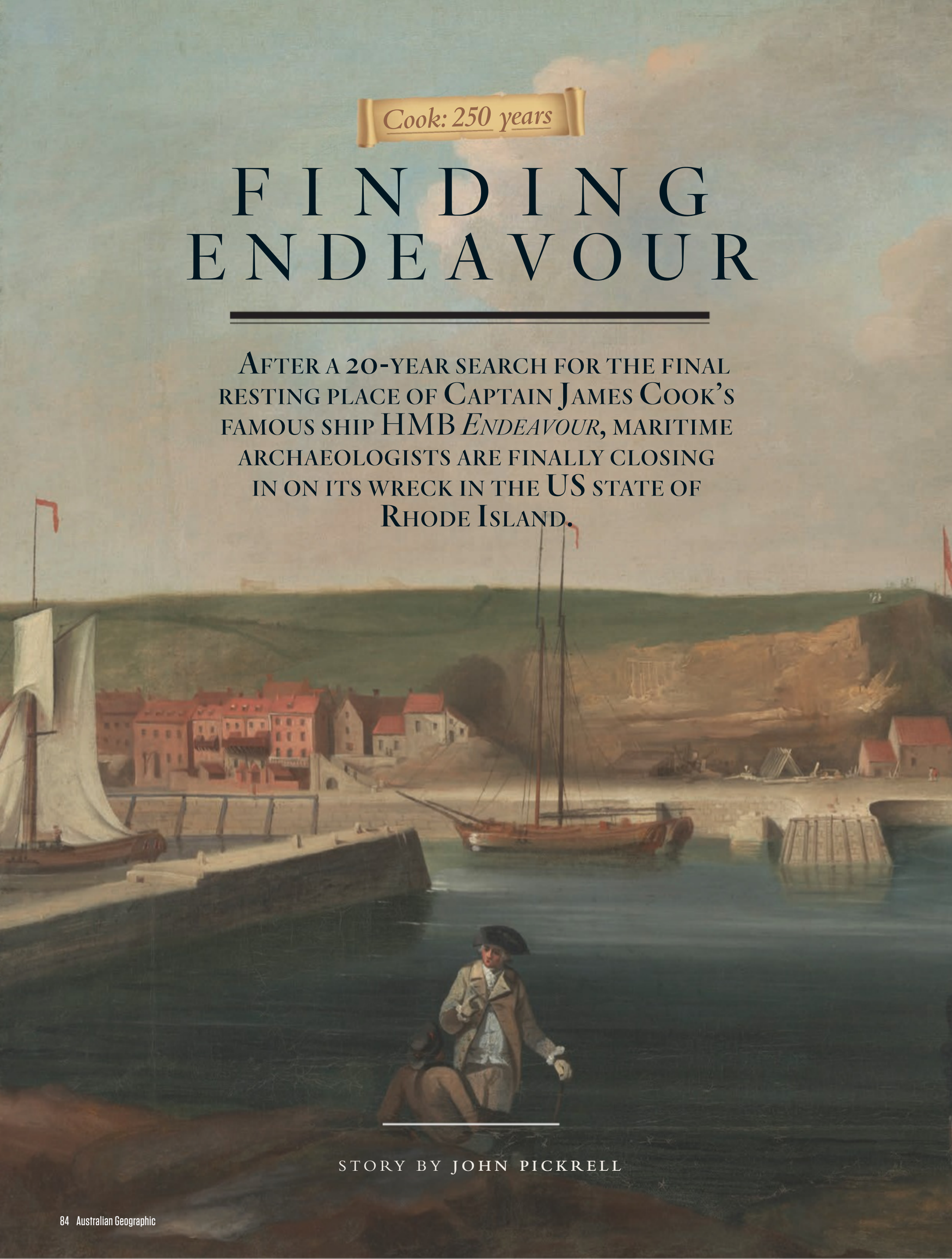
Eventually Barb breaks the silence. "It will rain one day and the waters will come again," she says, her voice almost quivering. "We just need a cyclone in Queensland to send some water this way, before it's too late."

While its ancient landscape is both alluring and unforgiving, it's the bravery of characters such as Barb that keep the outback spirit alive and make a visit to this often-bypassed corner of NSW so inspiring, no matter if the mighty Barka is flowing, or not.

Just watch out for all those goats.

AG

▶ TO WATCH a video by Andrew Gregory of this outback adventure visit: australiangeographic.com.au/155

The background of the page is a historical painting depicting a harbor scene. In the foreground, a man in 18th-century attire (a brown coat, white cravat, and black hat) stands on a rocky shore, looking out towards the water. Behind him, another person is partially visible. The harbor is filled with several sailing ships, including a large white-sailed vessel on the left and a smaller brown ship in the center. A long pier extends into the water. In the background, a coastal town with red-roofed buildings is nestled at the foot of a steep, green hill. The sky is a pale, hazy blue.

Cook: 250 years

FINDING ENDEAVOUR

AFTER A 20-YEAR SEARCH FOR THE FINAL
RESTING PLACE OF CAPTAIN JAMES COOK'S
FAMOUS SHIP HMB *ENDEAVOUR*, MARITIME
ARCHAEOLOGISTS ARE FINALLY CLOSING
IN ON ITS WRECK IN THE US STATE OF
RHODE ISLAND.

STORY BY JOHN PICKRELL

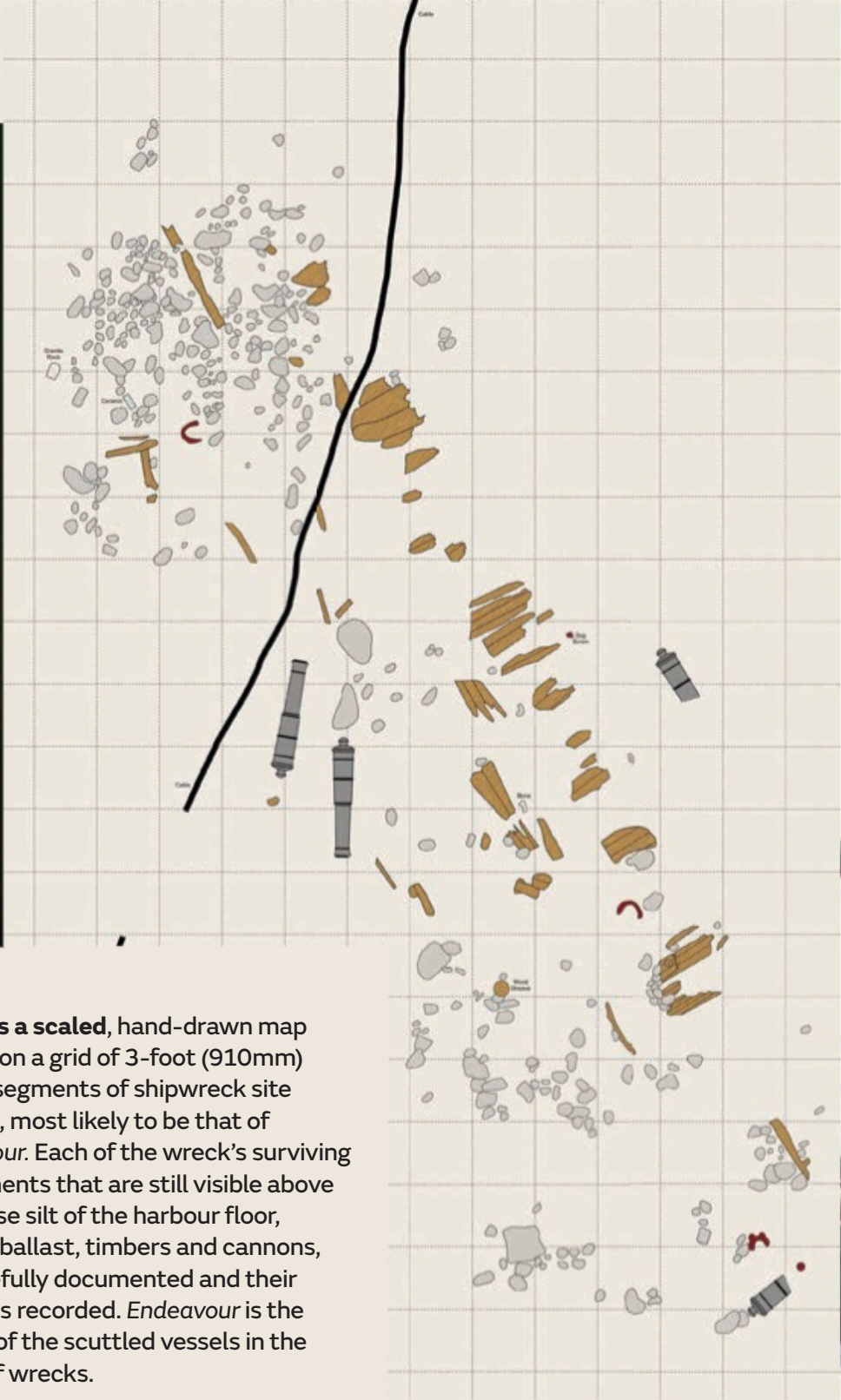
Cook's ship *Endeavour* began life as the collier *Earl of Pembroke* in 1764. It was built in the North Yorkshire port of Whitby from tough, durable, local oak. Designed to haul coal, it had a flat bottom, shallow draught and a capacious hold. It was earmarked for Cook's first scientific voyage and refitted at the Royal Dockyard, Deptford, London, in 1768.

Pictured: *The bark, Earl of Pembroke, leaving Whitby Harbour in 1768*, by Thomas Luny, c. 1790. National Library of Australia.





The remains of a cannon at shipwreck site RI 2394 off Newport, Rhode Island in the USA.



► This is a scaled, hand-drawn map plotted on a grid of 3-foot (910mm) square segments of shipwreck site RI 2394, most likely to be that of *Endeavour*. Each of the wreck's surviving components that are still visible above the dense silt of the harbour floor, such as ballast, timbers and cannons, are carefully documented and their positions recorded. *Endeavour* is the largest of the scuttled vessels in the group of wrecks.



▲ This 1780 French map of Newport Harbour charts the position on the seabed of the ships scuttled by the British to block access to the shoreline during the American War of Independence in 1778.

ON 22 AUGUST 1770, the crew of HMB *Endeavour*, led by Lieutenant James Cook, reached Possession Island, off the northern tip of Australia. From there they sailed east to the Dutch colony of Batavia for repairs, before making the long journey home. Cook's time in Australia was over, and although he would lead two more voyages of discovery, *Endeavour* was in a woeful state and no longer suitable to meet the rigours of such journeys.

Endeavour's stint in Australia is well documented, but what is less known is what happened after its return to England. A surprising chain of events saw it caught up in the 1775–1783 American War of Independence, and it eventually ended up on the murky sea floor of a historic harbour in Rhode Island, USA, where it still resides.

Between 1771 and 1774, the Royal Navy used *Endeavour* to shuttle goods and troops to the British garrison on the Falkland Islands, off Argentina. But in 1775, after the battered vessel was sold to private owner James Mather for £645, it disappeared from naval records, confounding historians.

The story long believed to be true was that *Endeavour* was renamed *La Liberté* and that it arrived in Rhode Island in 1793 as part of a French whaling fleet. The remnants of *La Liberté* disappeared long ago beneath land reclaimed as a parking lot, but its stern post, thought to be that of *Endeavour*, arrived in Australia for the bicentenary in 1988. It remains on display at the Australian National Maritime Museum (ANMM).

In 1997, however, Australian amateur historians Des Liddy and Mike Connell uncovered clues in a shipping register that *Endeavour* was, in fact, renamed *Lord Sandwich* and that *La Liberté* was actually HMS *Resolution*, which Cook sailed on his second and third voyages.

Subsequent sleuthing through historic records by experts including Dr Kathy Abbass, director of the Rhode Island Marine Archaeology Project (RIMAP), has painted a remarkable picture of *Endeavour's* final years as *Lord Sandwich*, including its role as a troop transport, shipping German Hessian mercenaries who ►

The modern replica of
HMB Endeavour, which is based at
the Australian National Maritime
Museum (ANMM) in Sydney,
is circumnavigating Australia
during 2020 to mark 250 years
since Cook's arrival at Botany Bay
on 29 April 1770.





Dr James Hunter, pictured with *Endeavour's* replica at the ANMM in Sydney's Darling Harbour.

SAILING TO AUSTRALIA WAS THE 18TH-CENTURY EQUIVALENT OF FLYING TO THE MOON.

hailed from the southern German province of Hesse-Cassel, to America to fight for the British.

By August 1778, she was being used as a prison hulk holding American revolutionaries in Rhode Island's Newport Harbour. The French had by then entered the war on the side of the Americans, and with a fleet of their warships poised to take Newport, *Lord Sandwich* was among 13 vessels deliberately sunk in formation by the British to block access to the harbour.

IT'S NOW 240 YEARS LATER, and on an unseasonably warm October day in 2018, Kathy Abbass perches on a chair on the waterfront of Newport's Goat Island. She looks out at buoys bobbing in the wide, grey expanse of the harbour. A suspension bridge stretches across Narragansett Bay behind her.

"When the British knew the French were coming, they told the navy vessels to destroy themselves," says Kathy, who is at once knowledgeable and formidable.

"Thirteen were sunk in a line here on the west side of Goat Island," she adds, gesturing towards the buoys that mark RIMAP's dive sites and the five wrecked vessels thought to include *Lord Sandwich* (formerly *Endeavour*).

There are more than 230 historic wrecks in this important colonial harbour. Kathy formed RIMAP in 1993 to study some involved in the American Revolution. She was not seeking *Endeavour* – in fact, as an American, it was barely on her radar.

But once the Australian enthusiasts presented her with the first clue that *Endeavour* might lie among the 13 vessels RIMAP was investigating, she pulled together a small amount of money to get to London. There, she found the chain of evidence to

prove that *Lord Sandwich* was the same vessel that had been around the world with Cook in 1768–71.

"I didn't stand up in the reading room of the Public Records Office and scream 'I found it!', because you don't do that, but it was exciting," she says.

"How many people in their career overturn an idea that has been around for 170 years?"

In the 18th century it was very common to rename vessels, as Mather did with *Endeavour* after he purchased it. Indeed, that was the second time the vessel had been renamed – its life began in 1764 in Whitby, Yorkshire, as the *Earl of Pembroke*, where it toiled as a collier transporting coal.

Both Kathy and Kevin Sumption, the director of Sydney's ANMM, believe the later renaming was to curry favour with John Montagu, the fourth Earl of Sandwich, who was Britain's First Lord of the Admiralty and a patron of Cook's voyages.

"It was a ploy to take a vessel in very poorly condition and play on the pride and ego of Lord Sandwich himself," Kevin says. After the outbreak of war in the American colonies in 1775, the British government was desperate for civilian ships to help it transport troops to quash the rebellion. *Endeavour* was tendered for consideration but initially rejected.

"The guy who sent Cook around the world was the fourth Earl, so I've always assumed it was renamed *Lord Sandwich* sucking up to him," Kathy says.

Whether it was that or the repairs that eventually swung it, the ship was accepted for service in February 1776 and three months later was carrying more than 200 Hessians on a crossing to the Americas.

► At the bottom of this photogrammetric composite image of part of the wreck, it's possible to see the cannon pictured on page 86. This technology has facilitated 3D digital modelling of sections of the shipwreck.

THERE ARE SEVERAL reasons why this information was lost in the mists of time. For a start, when *Lord Sandwich* arrived in Rhode Island, people may have had no idea it was the vessel that had sailed to Australia – the 18th-century equivalent of having flown to the Moon. Things were valued differently then. “It was more of the cult of the individual,” Kevin says. “It was, in fact, [botanist] Joseph Banks who was lauded on their return and Cook’s fame comes a little later. The ship itself was more incidental.”

The fact significant ships sometimes dropped into obscurity, combined with confusion made by frequent renaming, creates a mess for modern historians to unravel. “It becomes a bit of a melange of stories that researchers must pick apart, using archival evidence and first accounts, to get to something like a truth – rather than just trading on the mythologies,” Kevin says.

In this case, the research proved that the stern post on display at the ANMM was not that of *Endeavour*, but instead belonged to *Resolution*. “This taught us to meticulously research and not to be so gung-ho as to make claims that won’t stand up to testing,” Kevin says, explaining that it is exactly that careful approach that RIMAP and the ANMM are now taking with a wreck off Goat Island that they increasingly suspect is *Endeavour*.

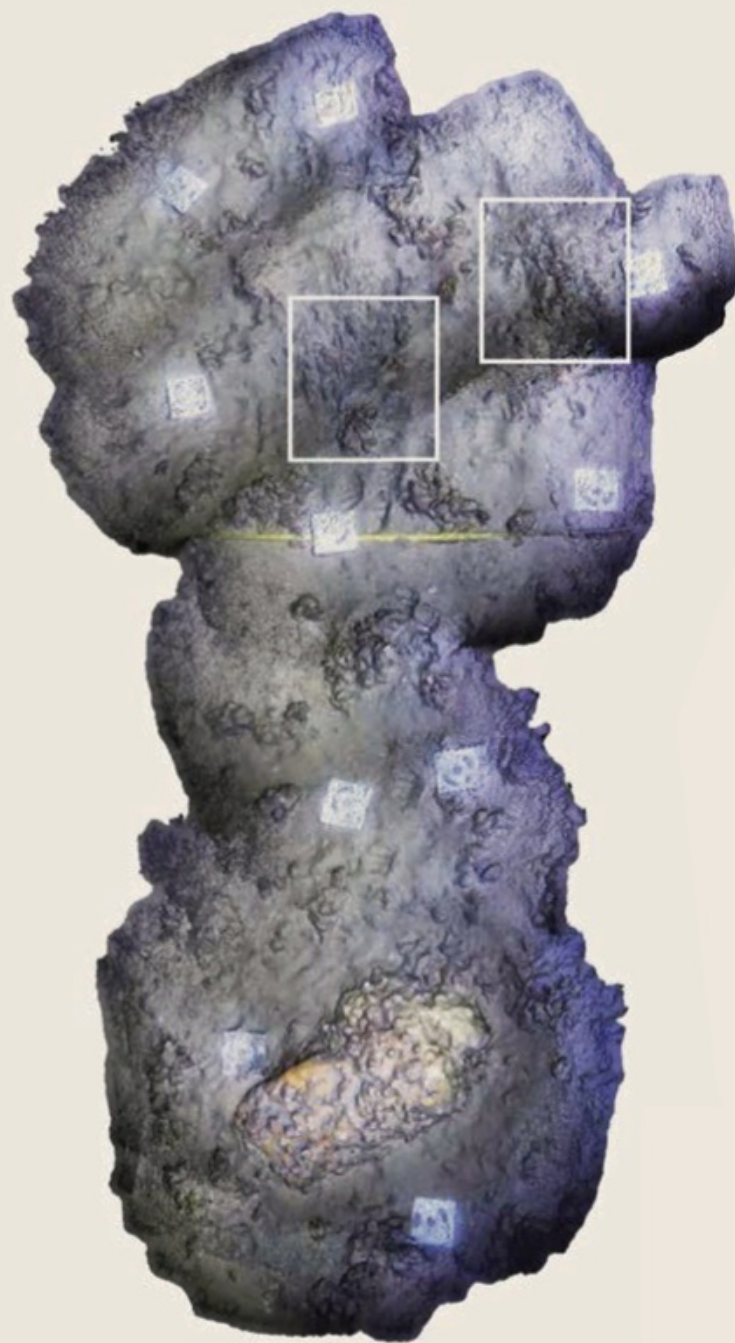
Since 1999 the ANMM has been an enthusiastic supporter of Kathy’s research, helping RIMAP with archival work and providing a grant that supports dives on the wreck sites each summer. The museum’s maritime archaeologists also fly from Sydney to participate in the dives.

After establishing RIMAP, but before finding evidence that *Lord Sandwich* was *Endeavour*, Kathy says she’d had a crisis of confidence. “About five to six years in, I started to think ‘this isn’t generating money, it doesn’t pay a living wage, why am I doing this?’” But finding the documents in 1999 that proved *Endeavour* was in Newport and might be found made her persevere. That was 20 years ago. For 16 years, they did work to pick away at which of the 13 might be *Endeavour*, but progress was slow – dives are restricted to short summer seasons and RIMAP is a volunteer organisation that scrapes by on small grants and donations.

“We are coming closer to saying we’ve found it, but we still have to prove it,” Kathy says. Improvements in technology – such as remote sensing and photogrammetry, which have been used to stitch together thousands of photos to create detailed 3D reconstructions of wreck sites – helped, and by 2016 they’d mapped out eight of the 13 wreck sites.

That’s when they had an incredible stroke of luck that helped narrow their search. In the 1700s, it was standard after a scuttling for a surveyor to record the precise locations of where ships went down. In 2016 the ANMM’s head of research, Dr Nigel Erskine, was scouring historic records at the National Maritime Museum in Greenwich, London, when he found just such a report. It was critical in identifying the position of *Lord Sandwich* as being among a group of five of the 13 vessels to the north-west of Goat Island.

“That particular document was very important because it had names of the vessels and where they were sunk,” Kathy says. “It



eliminated eight of the others and allowed us to focus on the five in the area where we know *Lord Sandwich* was put down.”

Within this group, they knew HMB *Endeavour*, a 368-tonne vessel, was at least a third bigger than any of the other transports. “So, if we can find everything in this study area, and say which is the biggest, then that’s likely to be *Endeavour*,” Kathy says.

IN 2018 THE RIMAP AND ANMM teams spent a week diving a promising site dubbed RI 2394 that they believe might be the wreck of the largest of the five vessels. But diving here, studying, and even just finding the wrecks, is difficult because visibility is poor and most of what remains of the 240-year-old wrecks is buried beneath the muddy seabed.

“It doesn’t look like much at all,” says ANMM maritime archaeologist and curator Dr James Hunter. “It doesn’t look anything like a ship. The average punter would swim right by.”

Unlike the gin-clear waters of the Caribbean or Coral seas, they’re lucky to see further than 2m in Newport, but James loves working there, nonetheless.

“Any day I get to dive on a shipwreck is a good day,” he says. “Every wreck has its own unique challenges and this one is no different – it’s a bit dark, a bit chilly, a bit deeper than many others, but very exciting.”

Cannons covered in dense marine growth are the only thing that might hint at a shipwreck to the casual observer, and they are what led to the discovery of RI 2394 in 2008. But if you get a little bit deeper, buried in the silty mud, in an environment starved of oxygen, are the remains of the hull structure, consisting of perhaps 10–20 per cent of the original ship. ►

► **A contemporary** view of Newport Harbour, off Rhode Island, America's smallest state. The harbour is rich in maritime history and one of the country's most significant shipwreck sites.



Because visibility is poor, photogrammetry has been critical as it allows the team to create digital models of the site that reveal the whole picture, allowing them to find clues to beams and other details of the ship's structure. "When you get a model like that you can pull back and see the whole thing... It was a eureka moment," says James.

Despite the fact the ANMM would dearly like to find evidence that this wreck is *Endeavour* during 2020 – to coincide with events marking 250 years since Cook arrived in Australia – there's no guarantee yet they have the right ship.

"What we're dealing with is what we can see above the surface of the silt. So we chose the largest wreck that was exposed the most, that had timbers on it, that had some cannons exposed," says Kevin. "But the next site over could be the same size or more covered over... There are all sorts of ways this might work out."

Kathy is often asked if the plan is to raise the wreck, but this is very unlikely. "Raising vessels is very expensive and is inappropriate. UNESCO says that's not the best use of a shipwreck anyway," she explains, adding that a complete excavation is not needed to prove this is *Endeavour*, and would expose it to oxygen and marine life that would degrade it.

"Our approach is to just open it up enough to get the data we need and take care of the artefacts that are there," she says. Leaving at least half the wreck undisturbed also means that, in the future, archaeologists with better technology and better knowledge can come back and make discoveries that wouldn't be possible today.

Instead, the plan is to find a variety of clues indicating that this is *Endeavour* – but the chance of her still containing any artefacts associated with Cook is very low. "Our assumption is that it is the later uses of the vessel as the *Lord Sandwich* – the transport, her involvement in the Revolutionary War, holding prisoners onboard – that are most likely to provide the evidence," Kathy explains. "And if we can prove we have the *Lord Sandwich*, then

we know we have *Endeavour*." Some of these things might be artefacts from her time as a prison hulk or even inscriptions scratched into the walls by known American revolutionaries detained on board. "You're hoping to find something like this, but it's a long bow to draw," Kevin says.

A SERIES OF dives in September 2019 started excavations, revealing part of the ship's structure and making some interesting discoveries. These included traces of leather, textiles, glass, ceramics, coal and ballast, as well as "a gunflint fragment and a fragment of a kaolin pipe stem manufactured between 1750 and 1800," says Dr Kerry Lynch, an archaeologist at the University of Massachusetts Amherst and RIMAP's field director.

While none provided a link to Cook's vessel, "these artefacts are diagnostic to the time period *Lord Sandwich* was scuttled and help associate this wreck to the transport fleet," she says. Some of the artefacts are now at RIMAP's lab at the Herreshoff Marine Museum in Bristol, Rhode Island, where they are being conserved and studied further.

Another "marvellous and unexpected" find was the scuttling hole that had been punched through the outer hull, proving the vessel was one of the transport fleet that had been deliberately sunk. "Since our excavation unit was only three feet wide, and the remainder of the vessel is currently unexcavated, this was an extraordinary stroke of luck," Kerry says.

Other ways *Endeavour* might be confirmed include finding repairs that match what was done to her either after her grounding in the Great Barrier Reef or in later refits, or finding unique quirks of her design, such as an unusual keelson structure that was added to vessels built at Whitby.

The wood used in Whitby is also very likely to have been distinct from that used in shipbuilding yards in North America, where some of the other scuttled vessels are believed to have been built.

Dr Kathy Abbass looks out over the archaeological site in Narragansett Bay with Claiborne Pell Newport Bridge in the background.



ENDEAVOUR WAS SCUTTLED ON 4 AUGUST 1778 AND COOK'S OWN DEMISE FOLLOWED JUST SIX MONTHS LATER

“We are trying to combine forensics, photogrammetry and material culture [historic artefacts] with archival research, to have a web of evidence that, when you put it all together, there’s just no way it could be anything other than *Endeavour*,” Kevin says.

As AUSTRALIAN GEOGRAPHIC goes to press, the team has dives planned in early 2020, which it is hopeful might turn up further elements of this mesh of proof.

EVEN IF RI 2394 proves not to be HMB *Endeavour*, Cook’s vessel is still almost certainly one of the five wrecks near Goat Island. Even just the prospect that they are working on “one of the most famous ships of all time” is a thrilling one, James says. “It’s almost like reaching back through time, to be able to touch that ship that witnessed so much.”

Revealing the untold story of this famous vessel has a special thrill. While everyone knows it as Cook’s HMB (His Majesty’s Bark) *Endeavour*, it had a series of other lives – it was a collier, *Earl of Pembroke*; a troop transport to the Falklands; and finally, *Lord Sandwich*, which played a part in the American Revolution.

“All of those aspects of that ship’s history are fascinating, and those are the things we know the least about,” James says.

At the time *Endeavour* arrived in Rhode Island, Newport was a major American port, with only Boston and Philadelphia being busier. Nevertheless, it’s incredible that both *Endeavour* and *Resolution*, “two of the most important exploration vessels of the Age of Enlightenment”, likely finished their careers there, Kevin says.

“Who would have thought that could be the case? That’s an amazing coincidence,” Kathy agrees. “People ask why would two of the vessels that sailed around the world with Cook end up in Newport Harbour. Well, that kind of coincidence happens in history a lot.”

Endeavour was scuttled on 4 August 1778 and Cook’s own demise followed just six months later, on 14 February 1779. Following a dispute with islanders, he was stabbed to death on the beach at Hawaii’s Kealahou Bay, where *Resolution* was moored for repairs. It was his death that would propel him, and the vessel in which he sailed to Australia, to fame.

“Cook was a nobody,” Kathy says. “He was a working-class guy who learnt all these skills as a navigator, cartographer and sailor. It wasn’t until his second and third voyage, and especially after he was killed, that he becomes the great icon.”

A decade later, in January 1788, the First Fleet arrived in Australia, an event that today has a complex and controversial legacy, much as Cook’s voyage does. Intriguingly, the British decision to colonise Australia was influenced by the loss of its 13 east-coast colonies in the Americas, where it was previously sending labour and prisoners.

“They’ve lost this strategic and economically important base in America and maybe it makes them start thinking about Australia as an alternative,” Kevin argues. “So, there is an important connection to the American War of Independence.

“It’s a relatively unknown end for HMB *Endeavour*, but it’s also interesting for such a significant vessel to end up in an engagement so fundamental to the British decision to colonise Australia.” 



The *Cook: 250 years* faraway nearby

Agnes Water and the Town of 1770 have a rich history that includes a visit from Cook 250 years ago, a turn as a remote, sleepy fishing village and its current incarnation as a laid-back holiday spot.

STORY BY PHIL JARRATT
PHOTOGRAPHY BY GRAHAME MCCONNELL

Low tide sandbar art at the Town of 1770 where Round Hill Creek flows into Bustard Bay and the Coral Sea.





IT WAS 1978 and we were on the kind of assignment freelance journalists don't get anymore. A magazine had given me a month to drive from Sydney to Cape York with a photographer to find the New Age hippie communes that had sprung up after 1973's epoch-making Aquarius Festival in Nimbin.

We'd thrown surfboards into a campervan on top of sleeping gear, camera equipment and a portable typewriter, and had already surfed our way up the coast for two weeks, darting into the hinterland to document the hippies. We really had to make some miles towards Cairns.

But instead, we were driving along a corrugated, untarred road two hours outside a place called Agnes Water, which wasn't on my map. All we knew was that it was on the coast, not far from the curiously named Town of 1770, which sounded just weird enough to attract hippies.

We pulled into the camping ground at Agnes, passing the general store with a lone petrol bowser out front, an hour before dark. Peacocks strutted past the row of tin-roof shacks that faced the beach, a communal barbecue pit smouldering outside. We rented a shack for \$2 a night and quickly unpacked the boards. Beyond the sand we'd

noticed an idyllic point break with shoulder-high waves peeling along its rocky rim...and no-one riding them.

The next three days saw us surfing the point with, at most, three or four others, sharing the catch and bottles

of rum with the fishermen who were our shack neighbours. Never saw a hippie, never got to the Town of 1770, but Agnes owned a piece of my heart, and, more than 40 years later, it still does.

“MAY 24, 1770 IS the most notable date in the history of Queensland,” declared Professor Francis Cumbrae-Stewart, in an address to the Royal Geographical Society of Queensland in Brisbane in 1925, “for on that day, on the banks of Round Hill Creek, the British first set foot on what is now Queensland soil.” From this rather pompous speech, which made no reference to the Meerooni people of the Gurang nation who'd lived in the area for centuries, was built a campaign that eventually resulted in the handful of holiday shacks being called “Town of 1770”, a name that's still often mistaken for a postcode. ▶





◀ **Chris De Aboitiz** shares a paddle with Lani, Rama and Max on the Round Hill estuary. Chris runs dog-friendly accommodation just outside town and teaches dog obedience classes and stand-up paddling.



1770
Agnes Water
• Brisbane



▲ **Kylie Stevens** sells the freshest fish in town, straight off local boats, from her van parked in the servo at the centre of Agnes.



◀ **Bustard Head Lighthouse**, the second oldest in QLD, is a beautiful and historic site. It's about 20km north-west of 1770, is located within the stunning Eurimbula NP and is still operating, its light visible up to 40km away.



Yet the Cook expedition's brief presence in the beautiful bay that forms the southern gateway to the Great Barrier Reef on what's now called the Discovery Coast might perhaps be better forgotten. For one thing, the men of *Endeavour* were stir-crazy after three weeks of looking at the coast but never making landfall, and when they finally did, many of them celebrated by being dead drunk from arrival to departure.

Cook wrote in his journal: "Last night some time in the Middle Watch a very extraordinary affair happened to Mr Orton my Clerk, he having been drinking in the Evening, some Malicious person or persons in the Ship took the advantage of his being drunk and cut off all the cloaths from off his back, not being satisfied with this they some time after went into his Cabin and cut off a part of both his Ears as he lay asleep in his bed...I look upon such proceedings as highly dangerous in such Voyages as this and the greatest insult that could be offer'd to my authority in this Ship."

Cook and his botanists, Banks and Solander, along with some trusted armed men, went briefly ashore and found nothing much of interest. They shot a bustard that gave them the best fresh meat they'd had since leaving England, named the bay Bustard Bay after the delicious "turkey" and were gone.

Not a lot to celebrate there, you'd think, compared with the extraordinary natural beauty of this wild stretch of coast.

▲ **Festival of 1770** event manager Debbie O'Flaherty (at left) with Captain Cook (Arron Wellsteed) and Samantha Organ, Indigenous liaison officer for the festival. This year's festival commemorates 250 years since Captain Cook's landing at the town.

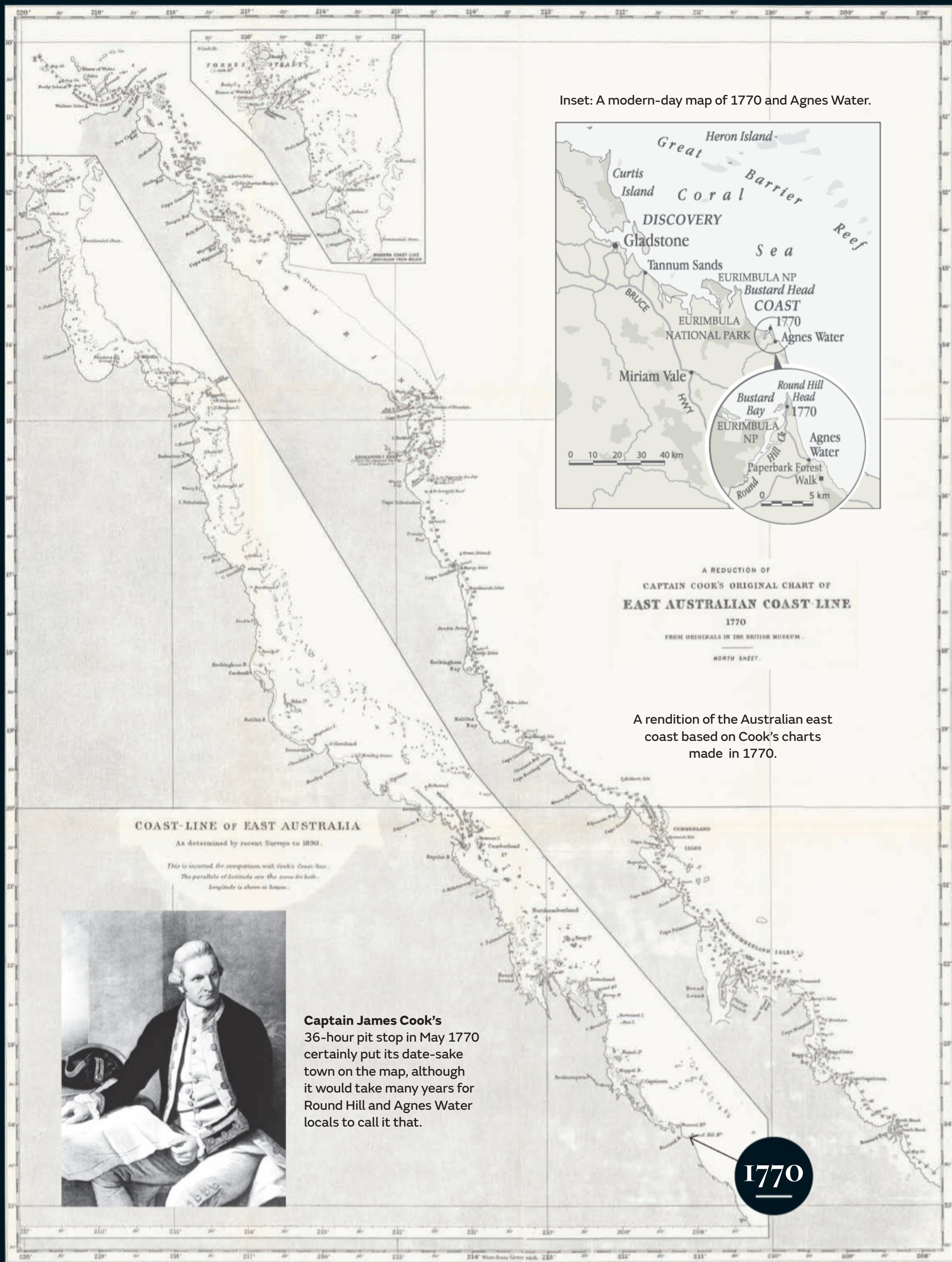
More info: visitagnes1770.com.au/1770-festival

In the 89 years between Cook's brief visit and Queensland being proclaimed a state, the Meerooni were mostly left to their seasonal circuit of fishing and hunting camps. European development of central Queensland was focused on gold to the south and cattle to the north.

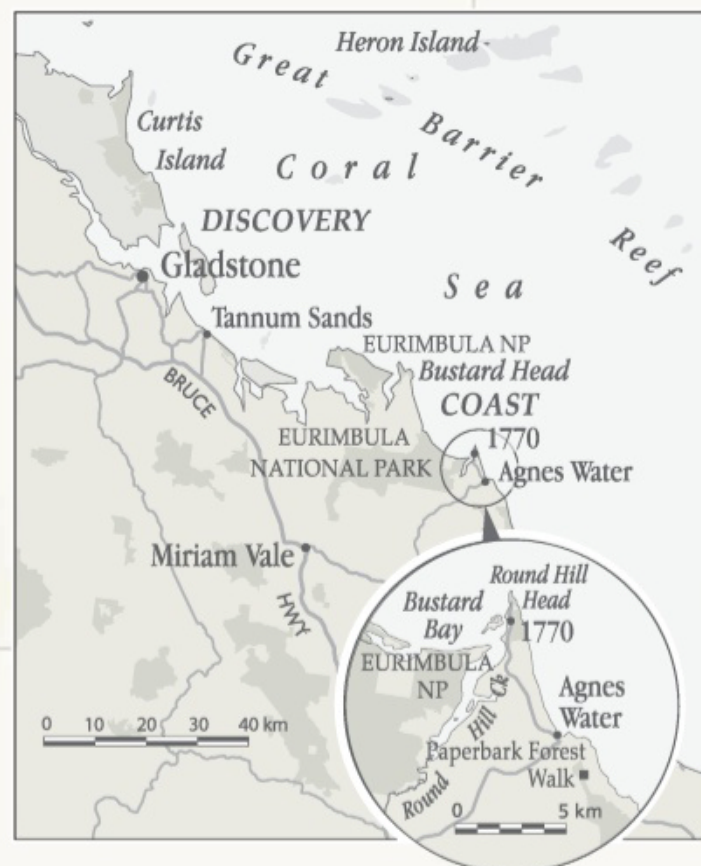
But in 1847 the British decided to rename the northern part of New South Wales the colony of "North Australia" and build its capital at Port Curtis, just along the coast from Bustard Bay.

The idea was that building the town and garrison would provide work for pardoned convicts from Van Diemen's Land. But the project was a disaster from the start, and no convicts ever saw Port Curtis. A few years later, however, pastoral development in the hinterland led to the creation of a service town and port at the same location, ironically named Gladstone after the British politician behind the failed Port Curtis settlement.

This, in turn, led to the building of a lighthouse and several cottages at Bustard Head. Over time, the workers' camp at Eurimbula Creek sawmill, near Round Hill Head, became a haunt for fishermen. Their weekend drinking parties sometimes shocked the shy South Sea ►



Inset: A modern-day map of 1770 and Agnes Water.



A REDUCTION OF
CAPTAIN COOK'S ORIGINAL CHART OF
EAST AUSTRALIAN COAST-LINE
1770
FROM ORIGINALS IN THE BRITISH MUSEUM.
NORTH SHEET.

A rendition of the Australian east coast based on Cook's charts made in 1770.

COAST-LINE OF EAST AUSTRALIA

As determined by recent Surveys to 1890.

This is inserted for comparison with Cook's Coast-line.
The parallels of Latitude are the same for both.
Longitude is shown at bottom.



Captain James Cook's
36-hour pit stop in May 1770 certainly put its date-sake town on the map, although it would take many years for Round Hill and Agnes Water locals to call it that.

1770



Still sleeping

Agnes: same as it ever was. Sure, it's grown, but compare these two aerial views of Agnes Water (above, shot in the early 1970s, and top, shot for AG in mid-2019) with just about any other beach resort town on the Australian east coast and it's relatively unchanged.



▲ **Paperbark Forest Walk** in Reedy Creek Reserve, just south of Agnes township. One of many delightful walking tracks that surround the town.

Islander sawmillers who worked there, but their search for fishing spots soon led to the discovery of the fertile sandbars and deep drop-offs of the Round Hill estuary.

In 1878 a Gladstone publican named Daniel Clowes and his son William – both keen fishermen – took up a lease on 12 square miles (31sq.km) of coastline that stretched south from Round Hill Head along a beautiful sandy beach. Clowes named his selection Agnes Water, after a cargo schooner that had disappeared in Bustard Bay a few years earlier. He put in stockyards and ran it as a cattle property, but after Clowes died in 1891, the lease and its makeshift buildings became a place for fishermen and their families to let off steam.

In the early years of the new century the Clowes homestead burnt to the ground and the property was more or less abandoned. But the more adventurous farmers and graziers from the Miriam Vale area began making summer expeditions to the coast. One of these was the family of Bill and Kate Jeffery, whose son Arthur later became the area's foremost historian. He wrote his memory of the first Agnes expedition, made when he was just five years old, in 1913: "Setting out from Miriam Vale after midday in a procession headed by one horseman, followed by three buggies, one sulky and draught horse and a spring cart loaded with the heavier supplies... spent the first night at Ten Mile Creek

▼ **Tourists explore the museum** in the lighthouse keeper's residence at Bustard Head, a fascinating day trip from 1770.



The journals of James Cook and Joseph Banks were of particular interest.

and the party was thrilled the next afternoon to have their first glimpse of the ocean through the trees of the Agnes range."

The Jefferys and their travelling companions cleared a track from Agnes Water Station to Round Hill Creek, where they set up camp next to the beach. Within two years, the first holiday shack would appear at Round Hill Creek, and by the 1930s the Jeffery men would build the second.

While Arthur Jeffery was serving with the AIF in the Middle East during World War II, his younger brother Tom farmed bananas and citrus in the fertile soil of the family property near Miriam Vale, selling much of the produce to the US military base in Brisbane. Tom and his wife, Beth, moved to Agnes Water with their young and growing family in 1951, Tom taking up the leases on both the 1770 and Agnes Water camping grounds that his father had held.

After the war, Arthur went to work at the Mount Isa Mines, then built a house next to his brother's at Agnes Water and turned it into a museum. Perpetually barefooted as he combed the beaches and scoured the forests for treasures, he gathered a unique collection of local flora, fauna and artefacts, to which he added mineral samples he'd collected around Mount Isa, and journals of the early explorers that he'd photocopied ►

▼ **Brothers Tom (at left) and Arthur Jeffery** cleared a track from Agnes Water Station to Round Hill Creek and set up one of the first shacks in the area.



By the 1960s, there was a fully functioning camping ground and general store.

in libraries around the country. The journals of James Cook and Joseph Banks were of particular interest. The museum opened in the summer of 1952 with 150 people signing the visitors book in the first month.

Meanwhile, Tom Jeffery's family continued to grow, and so did the buildings on the waterfront property. By the 1960s, there was a fully functioning camping ground and general store with petrol bowser operating next to the cattle run and crops. Sue Stirrat, the youngest of Tom and Beth's eight children, remembers: "Our house was where the amenities block for the caravan park is now, and the four shacks that our family rented were up the beach a bit, but even further along were the shacks that people would put up for themselves and pay a small lease on the land each year. In the early days, it was pretty much all family and close friends in the shacks, and we'd look forward to holidays when everyone would come. Mum had quite a few peacocks, which weren't very popular, and our cattle and horses would give the campers and the surfers a bit of grief if they didn't put their food away. Gradually, as more people came, we had to get rid of a lot of the animals."

THE ISOLATION OF AGNES and 1770 made it a tough life for a kid. "We were at the end of a very long dirt road. We were mostly schooled by



▲ **Sue Stirrat, youngest child of the late Tom and Beth Jeffery**, reminisces with one of many family photo albums over coffee at the Holiday Cafe on the beachfront at Agnes.

correspondence for that reason," Sue recalls. "We had no town electricity, no phones and no two-way radio. For a lot of years, the closest phone was at the Elliotts' homestead at Captain Creek, 12 miles out of town. If there was an emergency, that's where you had to go. But there weren't many emergencies. If flooding cut the road off, we'd always get by – maybe Dad would have to kill a beast, but we'd always be okay."

The isolation didn't worry the holidaymakers, many of whom lived on remote properties. By the end of the 1960s people had lost count of the shacks that had cropped up on the Jeffery property, but some recall at least 80. Ken 'Kojak' Chalmers, then a permanent Agnes resident with a successful earthmoving business, built one in 1968. "In those days Agnes was just three tracks running parallel to the beach with fibro shacks dotted about," he says. "You'd come down for the weekend and leave the keys in your car. The biggest dangers were Togo and Lionel, old Tom Jeffery's horses who'd walk right into your house and eat everything off your table. We were all just squatters. You'd go and see old Tom and show him where you wanted to build, and he'd say okay if he knew you. Tom had a little Mini Moke and he'd drive around the shacks with his cattle dog and have a rum with his old mates. When the surfies played up, he'd go down with his stockwhip and sool the blue bitch onto them." ►



Simplicity rules

More than 80 years apart, simple house design is still de rigueur for the area. The top picture is the glamping cottage at the Agnes Water Beach Caravan Park. Bottom is the second house built at 1770 in 1932 for Bill Jeffery.



It's certainly no Noosa, but that doesn't seem to bother too many residents of the Agnes Water-1770 coastline.

In autumn 1970, Kojak was commissioned by his boss, John Elliott, chairman of the local Bicentennial committee, to buy a jackhammer, carry it down the cliff at Round Hill, drill a hole in the rock, and drive a couple of big steel spikes down into it. These were to be the foundations for the Doorway to Destiny, a monument designed by Sir Raphael Cilento to commemorate the bicentenary of Cook's landing at 1770. So many people were expected to attend the unveiling that the beach at Round Hill was lined with hessian-covered temporary toilets. The night before the landing re-enactment, Kojak killed a kangaroo and hid it in the bushes where a costumed, musket-wielding crewman could sling it over his shoulder.

This was the first and last time that a kangaroo was harmed for the re-enactment, but the annual Captain Cook Festival has lived on, and Kojak will be there in the front row this May for the 250th.

By 1976, Tom Jeffery had had enough. His health was failing and the workload of maintaining the flourishing campground and the squatter colony wasn't helping. The developers were circling. Jeffery sold 365 acres to developer Lance Woodrow for \$1000 an acre, but before Woodrow could put in a development application, the Miriam Vale Shire Council insisted that every illegal shack had to come down. Even Lance wasn't spared

when his own shack was bulldozed by a council contractor in the early hours of the morning. "If I'd been sleeping in it, I would have been killed!" he shouted at the councillors during an expletive-filled harangue at the next meeting.

This was the start of 'the new Noosa', a term bandied about by developers even before the old Noosa had fully come of age as a sophisticated beach resort. But the physical similarities – a beautiful strip of coast and estuary surrounded by national parks – couldn't disguise the major differences, such as the lack of decent roads and infrastructure, emergency medical care and a decent supermarket. The sea-changers weren't quite ready for it.

Lance secured state government approval for a sand-mining operation just south of Agnes, meaning the dirt road from Miriam Vale would be sealed and new infrastructure put in place for the miners. Agnes and 1770 would prosper, he told the locals. But he hadn't counted on a strong conservationist backlash led by museum curator Arthur Jeffery, who may have spent much of his working life at the Mount Isa mines but wasn't about to see the paradise of his youth destroyed. The mining leases were rescinded.

Through the 1980s and '90s, many developers came and went, parroting the "new Noosa" mantra, but never quite pulling it off, even after the electricity and the



A sandboarding stop at Jenny Lind Creek, part of a Bustard Head day trip with a commercial tour operator.

The boom-bust cycle has become a way of life for the residents of the Discovery Coast.

phone came, a new road from Bundaberg cut down travel time and a primary school opened.

Each new phase of development optimism usually followed the sale of beachfront land to a celebrity. Film producer John ‘Strop’ Cornell (a writer and producer on the original *Crocodile Dundee* movie) was an early investor, and he sold up to Michael Baevski, of the Myer retail family, who had also snapped up the old sand mining lease for an eco-retreat called Sunrise at 1770. Former sports star Grant Kenny was another, with his Pavillions on 1770 resort.

According to real-estate veteran Garry Rapley, there have been enough “boom” years for most developers and land traders to make a buck, if not a fortune, but it has been off a very low base. “When we came here in 1989, the population was about 120, now it’s about 2000,” Garry says. “For many people that is one of its great attractions, but it also makes it difficult to put in a hospital or the other things that will attract an older resident population.”

The best years, says Garry, were from 2000 until 2008, when the global financial crisis began. Sales and prices went through the roof again in 2011 when Gladstone, an hour up the road, became the hub of the Queensland mining boom. But over the past few years, as the mining boom passed and holiday homes

hit the market at less than replacement cost, tourism to the Discovery Coast took a series of body blows as a sightseeing plane crashed with a tragic loss of life, a daytripper boat servicing Lady Musgrave Island caught fire and sank, and the Round Hill Creek bar silted up so much that commercial boats still cannot use it. In late 2018, a ring of bushfires advancing from Deepwater Creek to the south and Eurimbula to the west caused mass evacuations when it looked like Agnes Water would burn. It didn’t, but the crisis knocked another hole in the Christmas holiday trade.

The boom-bust cycle has become a way of life for the residents of the Discovery Coast. But even after decades of dashed hopes, there is a resilient spirit about the place and the people. And despite the problems, the smart operators in tourism and business are doing quite nicely. It’s not the new Noosa, and many residents are more than happy about that.

I already live in the old Noosa for much of the year, so it’s what brought me here, along with other bashed-up baby boomers and superannuated surfies looking for a quiet place under a banyan. And every morning I walk down the deserted beach, longboard on my head, to surf those point waves I fell in love with so long ago, I thank someone’s god for floods and fire and long dirt roads, and the fact that Agnes Water is still not quite on the radar. **AG**

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Uphill cycling efforts
reward with stunning views
of the surrounding forest,
along the mountain-biking
trails of Derby, TAS.

P114

Cavalcade
of quirky
Aussie
festivals

P106

Tassie's new mountain-biking hub

PHOTO CREDIT: BLUE DERBY PODS RIDE

Australian Geographic Society expeditions • Going wild • Road trip
• Recommended travel • Expedition diary • Festivals and Events



The Blue Derby Trails, in north-eastern TAS, wind through diverse forest habitats and past relics of Derby's tin-mining days.

GOING WILD

Going with the flow down Derby way

More than just a mountain-biking challenge,
the Blue Derby Trails are proving to also be an unlikely
saviour for a Tassie town in economic decline.

Story by Carolyn Beasley





*On 4 April 1929 in north-eastern Tasmania
the waterlogged wall of the Briseis Dam catastrophically
failed, sending a 30m-high rush of water down the
Cascade River valley.*

The dam provided sluicing water to one of the richest tin mines of its day. Without warning, the mine was flooded, 14 lives were lost, and the unsuspecting town of Derby was changed forever.

The Briseis Mine later reopened, but would never attain its former prosperity, and in 1948 it closed for good. Forestry provided employment for many during the following decades, but with the demise of timber company Gunns Limited, and changes to Tasmania's forestry policy, employment opportunities in this sector today have vastly reduced. Derby needed to reinvent itself, and what followed in 2015 was a seismic shift.

Today, as I arrive in Derby, 95 kilometres north-east of Launceston, I pass cars with fancy bikes standing proud on rooftops and gentrified workers' cottages advertising no vacancies. Lean, and clad in quick-dry clothes, the tourists here congregate in small groups at outdoor tables, sipping lattes or eating wood-fired pizza. Their trusty steeds of choice, mud-caked mountain bikes, hang by their seats from a steel rail beside the footpath. The scenery, the town, the lattes are all lovely, but make no mistake – these tourists are here for just one thing, mountain biking.

CROSSING THE ROAD, I'm startled by an unexpected sound. "Yeeew!" yells an enthusiastic teenage boy in a full-face helmet. He's careered out of the forest and, together with his friends, is hurtling down a steep street towards me. Stepping aside and consulting my map, I see this is the end of a mountain-bike trail. Finishing at the historic Derby Post Office, the trail is cleverly called Return to Sender. It's one of many that start and finish in town and constitute the Blue Derby Trails – 125km of purpose-built bike tracks.

The vision for the project came from the local Dorset Shire Council. Derby provided the perfect terrain and basic infrastructure, which meant the council could tap into the Tasmanian government's strategy to promote cycling tourism.

Initially, the trails cost about \$2.3 million to develop, with the local council and state and federal governments all contributing. The council has since contributed \$700,000 more to develop further stages.

The mayor, Greg Howard, considers it a modest investment for a very significant return. "In 2018 mountain biking brought about 30,000 visitors to



Derby Schoolhouse Museum volunteer Virginia Valentino (above) has converted her family's historic house to accommodate mountain bikers. She grew up in Derby, where mountain bikes now often hang along a steel rail (below), as cyclists drink coffee and browse the shops.



ride the trails," he says. That brings, Greg estimates, \$12–15 million to the north-eastern region annually, with flow-on economic benefits felt by neighbouring towns, including Branxholm and Scottsdale. Additional millions flow to the wider Tasmanian economy as the cyclists add on other destinations.

Before opening Blue Derby, the region struggled for employment options. "Over a 6–8-year period we lost a vegetable factory, two pine sawmills and a milk factory," Greg says.

He estimates that 900 jobs were lost, including those in the timber industry.



The newly opened St Helens Mountain Bike Trails, on TAS's east coast, include 10 stacked loop tracks of varying difficulty, some suitable for the whole family.



To date, Blue Derby has generated about 100 part-time and full-time jobs. For some youth in the municipality unable to find a job in forestry or farming, this provides a welcome opportunity to remain in the region.

The sentiment is echoed by Virginia Valentino, a long-time local and coordinator of the Derby Schoolhouse Museum. "In the old days nothing happened in town," she says. "Today, there are people in the park, kids out riding. Having seen this town sink further and further down, I love the energy that it's brought."

There has been a roughly six-fold increase in property values during the last decade, due to the biking boom. "A lot of locals decided to cash out of their houses," Virginia says, explaining that for older people that has meant the option of moving closer to medical facilities. "But the [local] community misses them."

One of the reasons Derby's trails are doing so well is their high-quality design. With the sport of mountain biking growing throughout Australia, trails are being built in many regions. Dorset Shire Council wanted Blue Derby to be world-class and hired the esteemed Australian company World Trail for the design. "We also have the gold standard for maintenance because [the] council does it all," Greg explains. With three full-time staff and \$200,000 per year allocated to the job, maintenance is taken seriously here.

Before opening Blue Derby, the region struggled for employment options.

The proof of Blue Derby's success is evident, being the only place in Australia to have hosted a leg of the prestigious World Enduro event, which it has done twice in the last three years. In 2017 one of the trails, Detonate, was voted the best in the world. With the trails being adored by pros, I set out to see if they could be tackled and enjoyed by a beginner such as myself.

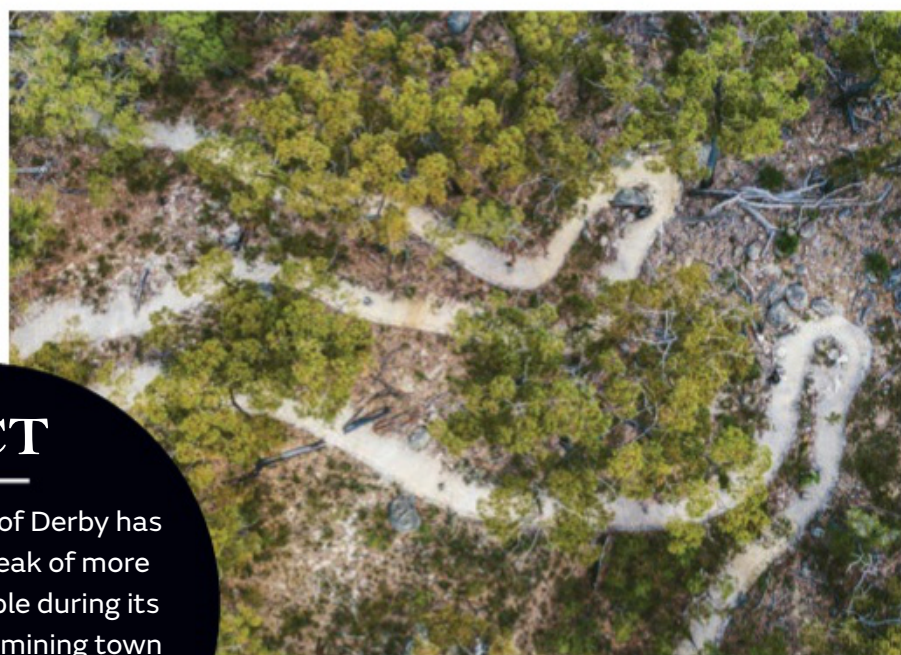
BIKE HIRE AND BIKE shuttle services are available in the town for independent travellers, but my group of five chooses a totally immersive experience, spending three days on the Blue Derby Pods Ride. The company offers a full-service package that includes all equipment, food, drinks, accommodation and transport from Launceston. All levels of riders are catered for, which is good news, because I'm counting on a lot of hand-holding.

My tuition begins with owner and guide Steve Howell explaining the basics of technique, including postures for descending and how to raise and drop ►



▼ **This trail through Derby tunnel** (below), originally built by a tin miner to remove waste rock, is among many signs of how mining shaped the landscape.

▼ **Switchbacks built** along the Bay of Fires Trail (bottom) help riders to traverse steep, open forest terrain that'd otherwise be almost impossible to ascend.



▲ **The 42km Bay of Fires Trail**, which is part of the recently opened St Helens Mountain Bike Trails, starts on the Blue Tier plateau and links to the Blue Derby Trails. Riding the Bay of Fires Trail takes about four and a half hours.

FACT

The population of Derby has fallen from a peak of more than 3000 people during its heyday as a tin-mining town in the 1890s to fewer than 200 today.

the luxurious pneumatic seat. The trails have colour markings like ski runs, with green for the easiest, blue for intermediate, and terrifying black runs for the experienced and fearless. As we try out a beginner trail, Steve explains that mountain biking here is beyond merely cycling and thrills and he hopes I find something more – an experience known as *flow*.

“Flow is this mental state, where you jump on a bike and all your troubles go away,” Steve says. “It’s a really focused Zen spot and it happens when you’re challenging yourself, testing your skills.”

I follow Steve onto the trails proper, adjacent to the town and ascend the gentle green trail called Axehead, past tree ferns lining the Cascade River as it cuts down the mountain past the tannin-stained but clear waters at Tasty Trout Falls. From the trails, it’s impossible to miss the town’s tin-mining history and how it’s shaped the landscape. Steve points out mountains that have been half washed away by sluicing with high-pressure water, and we follow one trail right through a mountain along an old mining access tunnel.

Forestry has shaped the landscape too, and, as we ascend the trails, we see areas where regrowth vegetation is dominated by Tasmanian blackwoods and other acacias, pioneer species that settle back into an area after disturbance.

Now mountain biking is shaping the landscape. The trails traverse a mix of Crown land and forestry coups, the latter being managed for the state government by Sustainable Timbers Tasmania for forestry purposes.

Mayor Greg says that in planning which coups are to be logged, Sustainable Timbers considers the visual amenity from the trails, ensuring a vegetation buffer always remains.

It’s a cooperative approach that recognises the value of both industries to the region and is also welcome news for any wildlife that may inhabit this piece of forest, such as the spotted-tail quoll, eastern barred bandicoot and Tasmanian devil.

Coexistence and conscious living are fundamental to the philosophy of Steve and his wife, Tara, in developing their mountain-biking business. They strive to

The Blue Derby Pods Ride itinerary

This three-day ride can be adapted for the preferred challenges of you or your group. With two guides and up to eight riders, you can choose to split up for sections on any given day. A standard itinerary might look like this.

Day 1

Collected in Launceston by your guides, you'll be fitted for bikes and helmets before a 90-minute drive to Derby. By late morning your guide will have run through a skills session and an easy lap of Lake Derby. Then it's over to the trailhead and main Blue Derby Trails. Ascend via the Long Shadows blue trail, then choose to head down the berms of Flickity Sticks to settle in at the architecturally designed accommodation Pods, or climb further to Flickity Sticks Upper, for a longer descent.

Day 2

Opt for the green Sawtooth trail before taking the 350m-long Derby Tunnel, built by a tin miner in the 1880s; then join Berms and Ferns, a rollercoaster of tree ferns and viewpoints into town. The more adventurous can choose the long ascent to the ridgetop, descending via Return to Sender, traversing rocky slabs for a rendezvous and coffee in town.

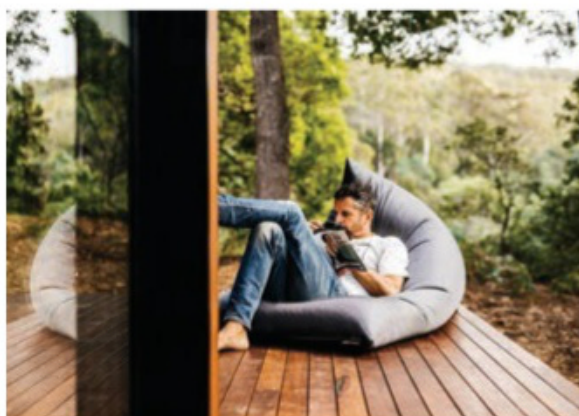


The Hub is the communal area of the Blue Derby Pods Ride accommodation, and riders will find it easy to relax here after a day of exertion.

FOR MORE INFO:

 ridetassie.com/blue-derby-maps

 bluederbypodside.com.au



After lunch at the Pods, afternoon options include Dam Busters, to circumnavigate the Cascade Dam (formerly the ill-fated Briseis Dam); or, for the advanced, there are black trails such as Trouty,

descending over boulders, or Detonate, one of the world's best.

Day 3

With the bikes in the trailer, it's a one-hour drive to Blue Tier, the highest point in the trails network, where lichens cover the ground. Climb a granite tor for views over mountain ranges to the coast, which can be reached via the new Bay of Fires Trail. The Blue Tier descent takes several hours, through ancient myrtle rainforest, under giant tree ferns and past streams frequented by platypuses. Finish with a riverside picnic lunch near Weldborough, before returning to Launceston.

The world outside Blue Derby melts away and I know I'm feeling 'the flow'.

make everything adhere to this ethos and, on my first day riding, I'm served a gastronomic picnic lunch in a river valley, featuring local produce, hearty fresh salads in waste-free stainless-steel boxes, peanut protein balls and fresh coffee made in a portable press.

Puffing after a decent uphill slog, we finally turn downhill onto the Flickity Sticks Trail, and I follow Steve's tips, banking around the berms (embankments) and switchbacks, proceeding tentatively at first.

As my confidence grows, my mental state shifts from slightly anxious to simple concentration, and, as the sparse eucalypt forest whips by, I find myself smiling, even yahooing a bit. The world outside Blue Derby melts away and I know I'm feeling 'the flow'.

UNEXPECTEDLY, STEVE exits the main trail, and we enter a secret grove among white gum giants. A curved timber building comes into view and I'm told we're home. The Pods, our accommodation complex, opened deep in the forest in 2017 and operates off the grid, with electricity generated entirely by solar panels. The bathrooms have odour-free composting toilets and solar-heated hot showers supplied by rainwater tanks. Despite its off-grid status, this is a luxurious forest experience.

The first building we explore is The Hub, for dining and lounging. Minimalist design and huge glass panels draw attention to the forest outside, where a deck with comfy bean bags invites us to savour a post-ride Tasmanian beverage. An open kitchen allows us to chat with Steve and co-guide Des Tarlington, as they prepare gourmet three-course meals from the produce of the surrounding countryside. As the evening chills, we're lulled into a torpor by the cosy slow combustion fireplace.

The four, strikingly curved, double sleeping pods are raised off the ground on legs, minimising their ▶



◀ **The Bay of Fires**
Trail finishes on the famous coastline at Swimcart Beach, not far from the town of St Helens.

The idea of mountain-bike tourism is catching on throughout Tasmania.

footprint. During construction, most vegetation on the 1ha site was preserved, with the buildings slotted in among existing trees. Branches were held back with ratchet straps and later released for an instant effect of being cradled in the trees. From inside my pod, a huge window immerses me in branches dripping with lichens. A jumbo bed adjoins the glass and, before sleeping, I soak up the starry sky from my pillow.

Tara explains that even the architecture of the pods was designed to promote conscious living and a reconsideration of the status quo. “Why do buildings need to be square?” Tara asks, and I realise she’s a person like many in Derby, who prefers to think quite outside the box.

The idea of mountain-bike tourism is catching on throughout Tasmania. An hour from Hobart in the Derwent Valley, the privately owned Maydena Bike Park opened in 2018. This gravity-based park with 62 trails built across an 820m-vertical rise has trails that run from green to double-black and pro levels.

Near Derby, the newest kid on the mountain-biking block is the east coast town of St Helens, where late last year, the local Break O’Day Council opened the first stages of 110km of trails including 10 stacked loop trails on the edge of town. The crowning glory is the 42km Bay of Fires Trail, which links to the Blue Derby Trail system. This epic ride starts on the subalpine plateau of Blue Tier and descends through myrtle rainforest and open woodland, emerging at Swimcart Beach on the famous Bay of Fires coast.

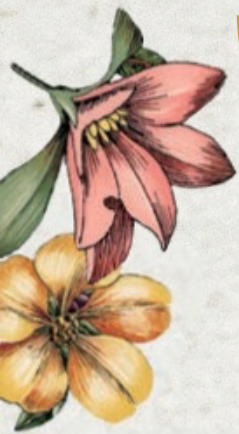
The council hopes mountain biking will attract 26,000 extra visitors a year and reports that more than \$15 million in investment has occurred in St Helens before the trails have even opened. The Big4 St Helens Holiday Park has installed a bunkhouse for travellers seeking budget share accommodation, with a communal camp kitchen and bike wash facilities. A new NRMA St Helens Waterfront Holiday Park has also been built and two major accommodation facilities are being upgraded. A major bike retailer has opened a shop, with Vertigo MTB from Derby soon also opening a branch.

BACK IN DOWNTOWN Derby, I’m pedalling along the path by the gurgling Ringarooma River, marvelling at how much a town can change. I think of the devastation that occurred right here in 1929, when the torrent from the Briseis Dam was so powerful it reversed this river, forcing it uphill for 10km.

The flooded mine itself has become Lake Derby and today families on bikes cross a suspension bridge to potter around on beginner trails. And, if mayor Greg Howard gets his way, the mine’s green cliff top will one day be the starting point for a zipline.

At the asphalt pump track local kids are zooming around and practising jumps as groups of parents take turns riding the Blue Derby Trails. I hold my breath as a two-year-old girl on a balance bike flies down the face of a jump, and my heart is in my mouth as she lands it, laughing. She’s obviously done this before, and, growing up in Derby, she now has mountain biking in her blood. Her generation can look forward to a sustainable future, riding high on the mountain-biking boom. AG

▶ **TO WATCH A VIDEO** of the Blue Derby Pods Ride see australiangeographic.com.au/155



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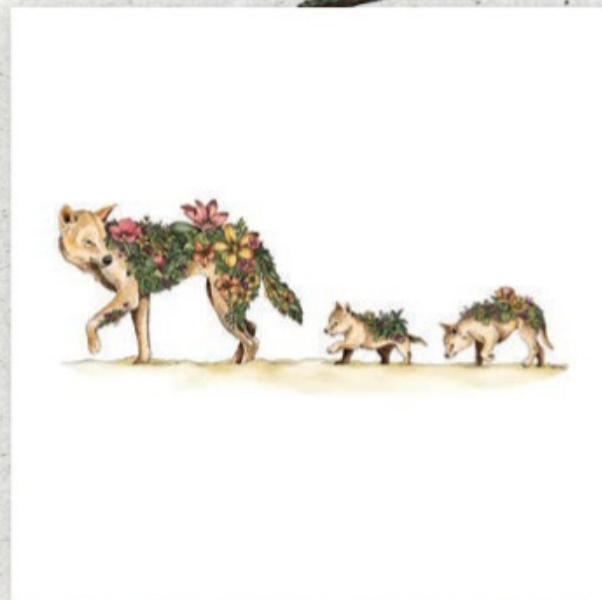
Exclusively designed for Australian Geographic in partnership with wildlife conservation artist Nathan Ferlazzo, these charming, limited-edition prints are available now. A share of profits from each product is donated to the Australian Geographic Society, supporting Australian wildlife conservation.



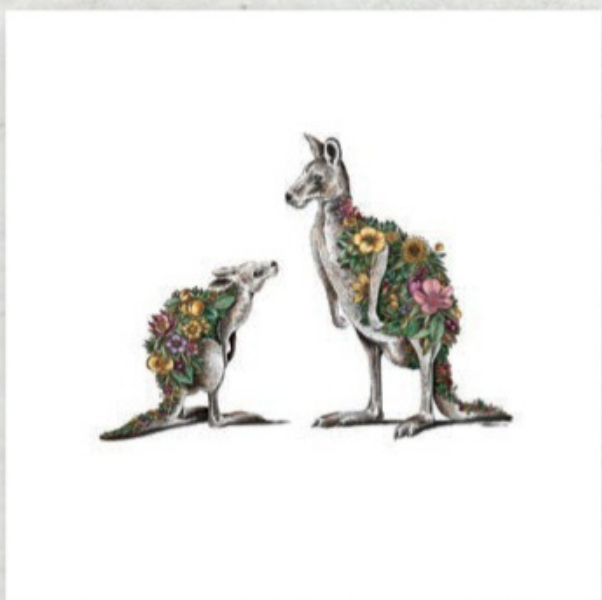
Quokka & Joey AGR702-297, AGR702-420



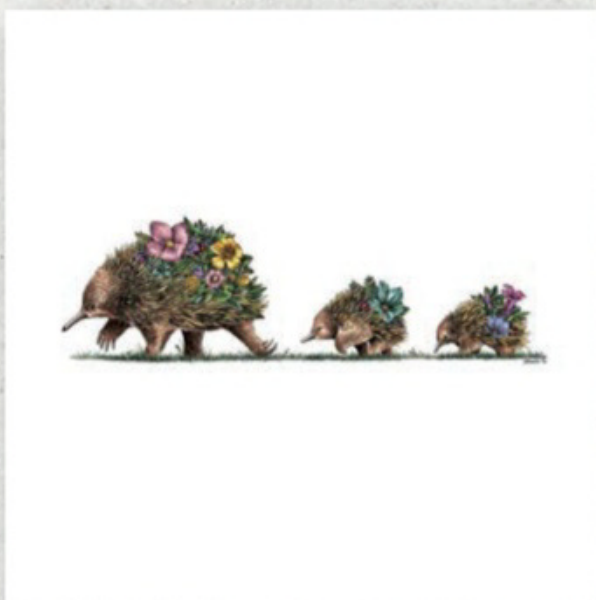
Bilby & Joey AGR700-297, AGR700-420



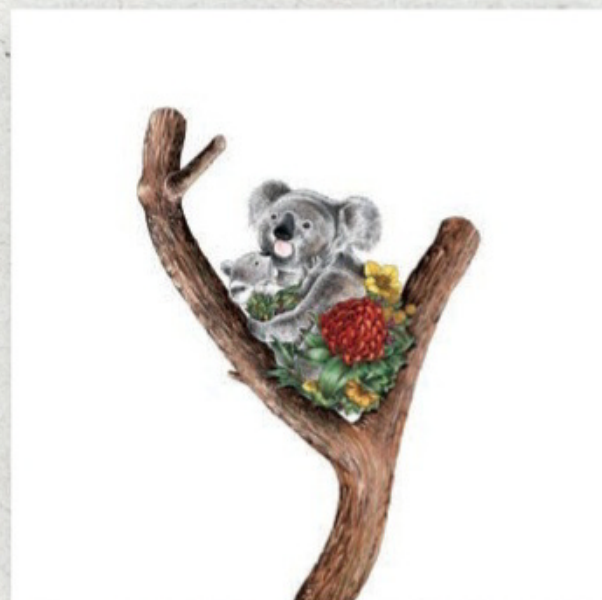
Dingo & Pups AGR703-297, AGR703-420



Kangaroo & Joey AGR705-297, AGR705-420



Echidna & Puggles AGR704-297, AGR704-420



Koala Cuddle AGR706-297, AGR706-420



Penguin Parade AGR707-297, AGR707-420



Wombat & Joey AGR701-297, AGR701-420

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Late afternoon action at
the Mullewa Rodeo in WA.

THE BEATING HEART OF AUSTRALIA

Quirky festivals and events keep our rural
communities ticking along and offer plenty of
reasons to add remote outback towns to your
travel plans.

STORY AND PHOTOGRAPHY BY NICK RAINS



MULLEWA MUSTER & RODEO

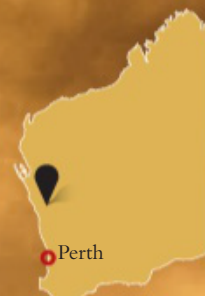
Mullewa Recreation Grounds
Mullewa, WA

Held on the weekend preceding WA Day (first Monday in June)

Annually

 mullewamuster.com.au/rodeo

Established 2012



If they can stay in the saddle for the full eight seconds, bronco riders are rescued from their bucking mounts by highly skilled sweepers. Rodeos are a staple of rural Australia's community events calendars, running at least annually in most large country towns.

Winner of the Miss BaconFest beauty pageant, Audrey Azure, displays her bacon rasher beach towel.



KINGAROY BACONFEST

Kingaroy,
South Burnett, QLD
Late August, for three days
Annually
📱 kingaroybaconfest.com.au
Established 2018

This meat-lover's foodie festival was founded in 2018 in Kingaroy, home to one of Australia's biggest pork-processing plants – also one of the town's biggest employers. Based at the Kingaroy Town Hall, BaconFest celebrates all things pork and the importance of buying Australian-produced pork.

IN ALMOST FOUR decades as a professional photographer and 20 years of working with AUSTRALIAN GEOGRAPHIC, I've often been privileged to step, albeit briefly, into the lives of people from many different walks of life – remote, rural, industrial, coastal, urban, Indigenous, wealthy, battling, feral and just plain peculiar. Experiences that often grab my imagination, and my lens, are those involving unsung local events in which a bunch of volunteers go to extraordinary lengths to create some form of themed activity – all in the name of community.

The capacity of Aussies to dream up colourful and quirky community events seems limitless. Sometimes these are sparked by a need to raise funds for worthy causes such as the Royal Flying Doctor Service (RFDS), local fireys or other similarly deserving recipients. Other times they're simply inspired by a group of locals with common interests in anything from horses to music or Elvis to bacon (yes, really). Even better, from a photographer's point of view, few things are more interesting (and challenging) than documenting ordinary people having tremendous amounts of fun and demonstrating a vibrant community spirit.

My book *Heart of Australia* (published March 2020) was inspired by a commission I received from South Australia's Outback Communities Authority to create a collection of images of rural life in SA. During an extensive three-week road trip my wife, Janelle, and I explored the state, visiting many towns and villages to create the pictures for the project. In my past as a

photographer, I've always been more interested in landscapes. But in recent years I've gravitated more towards photographing people, and this assignment gave me ample opportunity to explore that.

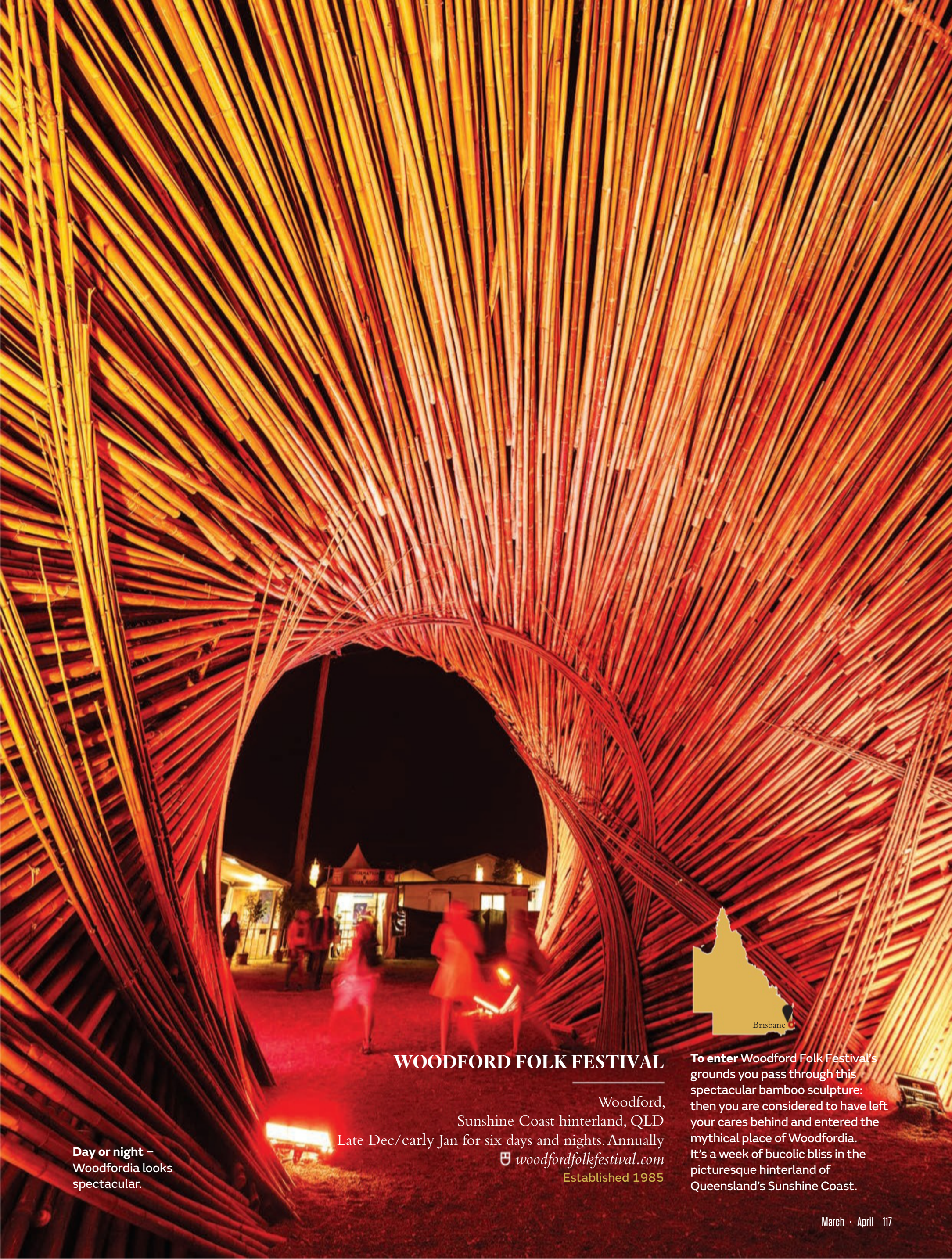
On one occasion I went into a hotel in the small town of Copley (population 104) and saw a flyer pinned to the bar advertising a fundraiser for the RFDS. It was to be nine holes of golf at a local outback station and, as luck would have it, the date was the very next day. I rang up and asked if I could come along, explaining what I was up to, and was told I'd be welcomed.

Imagine a golf course recently bulldozed through the scrub with cleared patches of oiled sand and the greens baking under a blistering sun on a day where the mercury topped 40°C. Then picture a group of people in fancy dress taking the whole golfing thing very seriously, as golfers tend to do.

There was a water truck doing the rounds making sure everyone was well hydrated, as well as a shuttle bus (a restored vintage Bedford truck) for those who'd succumbed to the heat and were in need of more serious rehydration in the form of icy cold beer back at the ►



NICK RAINS is a Master Photographer of the Australian Institute of Professional Photography who specialises in travel and documentary work. His first assignment for AUSTRALIAN GEOGRAPHIC, about Lake Eyre in flood, appeared in 2001 (AG 63) and his most recent was *Scenic and serene* (AG 136).



Day or night –
Woodfordia looks
spectacular.

WOODFORD FOLK FESTIVAL

Woodford,
Sunshine Coast hinterland, QLD
Late Dec/early Jan for six days and nights. Annually
 woodfordfolkfestival.com
Established 1985



To enter Woodford Folk Festival's grounds you pass through this spectacular bamboo sculpture: then you are considered to have left your cares behind and entered the mythical place of Woodfordia. It's a week of bucolic bliss in the picturesque hinterland of Queensland's Sunshine Coast.

Checking out the competition before entering the Barunga dance area.



BARUNGA FESTIVAL

Barunga
(80km east of Katherine), NT
Three days on the Queen's
birthday long weekend in June.
Annually.
barungafestival.com.au
Established 1985.

This Indigenous celebration is a frenetic showcase of music, sport and culture in the Top End. Dozens of local and not-so-local communities send groups to Barunga to take part in the Bungul – traditional dance displays (see AG 149).

nearby shearing shed that served as a makeshift bar. All this was run, independently of any formal organisation, to raise money for the RFDS whose services provide a critical lifeline in remote Australian towns like Copley. The golfers raise more than \$10,000 each time they hold this event.

Local communities are the lifeblood of any society and, like all social mechanisms, need individual work and commitment to keep them functioning well. Shared effort is the vital community 'glue', but it helps enormously if there is also a common goal or theme to work towards, whether it be that small-scale desert golf day or a huge undertaking such as the Deni (Denilikin) Ute Muster. That annual festival in out-back New South Wales began in 1999 and has grown in popularity. In 2018 it hosted 7093 utes and more than 20,000 visitors.

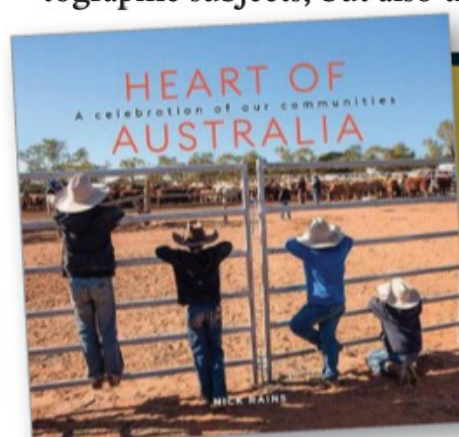
I decided to expand the original SA project into a celebratory book about Australia's community events large and small, and it became as much a logistical exercise as a creative one. The dates of the bigger events are obviously fixed well ahead of time, which is a good thing. But working out an itinerary that allowed me to visit as many significant events as possible in a limited time frame proved to be tricky and I had to miss out on a few of the bigger, more widely known ones such as the Birdsville Races.

However, it was the smaller events that proved the most challenging – not photographing them, but finding

out about them in the first place. There are probably hundreds of small community events that you'll never hear about unless you're a local. BaconFest, in the southern Queensland agricultural town of Kingaroy, is a good example. I found out about this new festival while photographing a farmer carefully brushing his prize bull at the Ekka (Queensland's largest agricultural show), in Brisbane. When he found out why I was there taking photos he told me about the upcoming and inaugural BaconFest 2018 in his home town. How could I resist such a neat bit of serendipity!

I shot the images for the book during a 15-month period – creating 30,000 images in all. They were whittled down to about 2000 before the design work, and we ended up with about 300 in the book.

My AUSTRALIAN GEOGRAPHIC work has always been about photographing people and places. This project was all about people – the most challenging of all photographic subjects, but also the most fascinating. 



HEART OF AUSTRALIA

To win a copy of Nick Rains's new book *Heart of Australia: A Celebration of Our Communities*, see page 33.



No-one is too young to be Elvis at the Parkes Elvis Festival.



One of many painted faces at the Huon Valley festival.

▲ PARKES ELVIS FESTIVAL

Parkes, NSW
 Second week of January, coinciding with
 Elvis's birthday. Annually
 📄 parkeselvisfestival.com.au
 Established 1993



Everywhere you look on the streets of Parkes during the festival there will be an Elvis of some description – old Elvises, tall Elvises, rotund Elvises and very young Elvises. It's a genuine family affair and also a free event, which makes it very accessible. Only the headline Elvis acts are ticketed. Catch the Elvis and Blue Suede Express trains from Sydney.

▼ HUON VALLEY MIDWINTER FESTIVAL

Huonville, TAS
 A weekend in mid-July. Annually
 📄 huonvalleymidwinterfest.com.au
 Established 2014



Out of all the events featured in the book, this one stood out by the sheer effort to which participants had gone to get into the spirit of things by dressing up in elaborate costumes and putting on intricate and creative make-up. Think a mix of Pagan, Wicca and Game of Thrones and you'll get the idea.

A hand-shearing demonstration at the Bream Creek Show.



BREAM CREEK SHOW

Near Copping, TAS
Third Saturday in March. Annually
 breamcreekshow.com.au
Established 1897



The tiny Tasmanian east coast town of Bream Creek held its first show in 1897 and has had one every year since, making it the oldest continually running show in Australia. Shearer Jim Haney will have been to many of them over the decades – he's been hand-shearing here for 53 years.

Yothu Yindi in full swing during the finale of the Yarrabah Music & Cultural Festival.



Staying in the saddle for the full eight seconds must feel like an eternity.

▲ YARRABAH MUSIC & CULTURAL FESTIVAL

Yarrabah, QLD

A day during October (check the website).

Annually

📄 qmf.org.au



Yothu Yindi were the headline act here in 2019.

It was the first time the multi-award winning Indigenous dance music act had performed together since the passing of founding member and former Australian of the Year Mandawuy Yunupingu in 2013. Needless to say the crowd loved it, especially after seeing new Indigenous music sensations Baker Boy and Thandi Phoenix perform earlier that evening.

▲ MAN FROM SNOWY RIVER BUSH FESTIVAL

Corryong, VIC

Four days in April. Annually

📄 bushfestival.com.au

Established 1995



In this festival, based on the iconic Banjo Paterson poem, many of Australia's top country horsemen and women compete in a gruelling three-day event involving different types of horsemanship, among many other bush activities.

AG

Australian GEOGRAPHIC

Out early
May

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Weird and wonderful

Shedding light on the mysterious world of jellyfish

PLUS:

- What are we doing with all that rubbish?
- Cosgrove Track: the world's longest volcanic chain
- PNG adventures by sea

A jelly blubber photographed at sunset off the NSW south coast. These common jellies can occur in huge blooms in estuaries along the eastern seaboard of Australia.

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agpresents@australiangeographic.com



Expedition diary

AG SOCIETY HOSTED EXPERIENCES

Come on an adventure with us while raising funds for the AG Society at the same time.



Battles and beaches of the South Pacific

Join us on board expedition vessel *Coral Discoverer* on a 13-night expedition voyage through the autonomous regions of Bougainville, Solomon Islands and Vanuatu to commemorate the 75th Anniversary of the end of WWII in May 1945. This expedition explores the history of the period and will also offer guests an immersion into the idyllic island landscapes, strong cultural traditions of Pacific Islanders and the renowned warmth and hospitality of the peoples of the Pacific.

WHO: Coral Expeditions

DATES: 13 nights | 23 October 2020
hosted by Alasdair McGregor

COST: From \$10,340pp

BOOKINGS: Call 1800 079 545,
email explore@coralexpeditions.com
or visit the website (see below)

OCT
2020



HOSTED BY
AG'S ALASDAIR
MCGREGOR



Outerknown adventures on the Great Barrier Reef



HOSTED BY DR DEAN MILLER

JULY
2021

A new era of Great Barrier Reef (GBR) expeditions has arrived with Coral Expeditions' all-new seven-night voyages. Journey beyond the known and to the outer edge of the GBR to discover abundant marine life, ancient cultures, seabirds and solitude amid this iconic seascape. Travelling aboard our yacht-like vessel, *Coral Discoverer*, with no more than 72 fellow travellers, you will be led by our expert guides, meet new friends and enjoy the GBR like few have.

WHO: Coral Expeditions

DATES: 7 nights | 21 July 2021
hosted by Dr Dean Miller

COST: From \$4750pp

BOOKINGS: Call 1800 079 545, email
explore@coralexpeditions.com or visit
the website (see below)

BOOKINGS:  coralexpeditions.com

Coastal wilds of Tasmania

Come on an exploration of Australia's island state, where the Southern, Indian and Pacific Oceans collide, where pristine World Heritage wilderness and national parks teem with native wildlife, and rugged mountain ranges culminate in soaring coastal cliffs and crescent-shaped beaches. This island, shaped by its climate, fertile pastures and verdant valleys, produces a bounty of world-renowned food, wine and artisanal beers and spirits, making a Tasmanian expedition cruise tantalising for all the senses.

WHO: Coral Expeditions
DATES: 10 nights | 17 January 2021
COST: \$7200pp
BOOKINGS: Call 1800 079 545, email explore@coralexpeditions.com or visit the website (see below)



HOSTED BY AG'S JUSTIN JONES

JAN
2021



BOOKINGS:  coralexpeditions.com



HOSTED BY AG'S CHRIS BRAY

DATES: 26 MAR 2021



Island outposts of Australia's west

Join us aboard new *Coral Geographer* for a 27-night voyage of island outposts off Australia's west coast. With no more than 120 guests, sail from Fremantle for the farthest reaches of the Australian territories, taking in the Abrolhos Islands, Shark Bay, Cocos (Keeling) Islands, Christmas Island and Ashmore Reef before returning to Darwin. Discover the secrets of red sand country and enjoy close encounters with extraordinary wildlife on this once-in-a-lifetime adventure.

WHO: Coral Expeditions
DATES: 27 nights | 26 March 2021
COST: \$19,990pp
BOOKINGS: Call 1800 079 545, email explore@coralexpeditions.com or visit the website (see below)

BOOKINGS:  coralexpeditions.com

DATES: 1 & 10 August 2020

HOSTED BY AG'S
JO RUNCIMAN OR TODD TAI

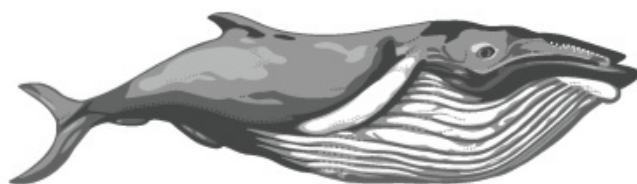


Explore the Kimberley coast with APT

Join APT and the AGS on a 10-day expedition cruise, exploring the Kimberley coast on an intimate small ship. Venture out daily on Zodiac excursions to remote locations usually inaccessible to most travellers and explore areas teeming with marine life. Be hosted by an experienced AGS host – Jo Runciman or Todd Tai. Enjoy an all-inclusive lifestyle on board, where everything is taken care of, and learn from your expert expedition team.

WHO: APT
DATES: 10 nights | 1 & 10 August 2020
COST: From \$10,995pp. Flights included for a limited time
BOOKINGS: Call 1300 184 577 or visit the website (see below)

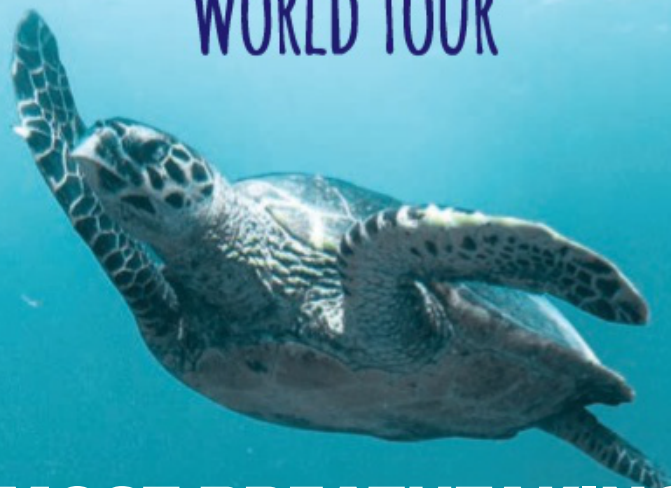
BOOKINGS:  aptouring.com.au/Kimberley2020



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WORLD TOUR



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FROM ABOVE AND BELOW THE SURFACE.**



CANBERRA 10-12 March • **NFSA National Film & Sound Archive**

AVOCA BEACH 20 March • **Avoca Beach Picture Theatre**

BYRON BAY 13-14 March • **Byron Theatre**

COFFS HARBOUR 14 March • **Jetty Memorial Theatre**

FORSTER/TUNCURRY 18 March • **Great Lakes Cinema 3**

NEWCASTLE 19 March • **Event Cinemas Kotara**

SYDNEY EAST 10-11 March • **Randwick Ritz Cinema**

SYDNEY 4-5 March • **Seymour Centre**

SYDNEY NORTH 3-5 March • **Hayden Orpheum**

ULLADULLA 1 April • **Arcadia Cinemas**

WOLLONGONG 12 March • **Uni Movies, UOW**

ALICE SPRINGS 13 March • **Araluen Arts Centre**

DARWIN 23-24 June • **Deckchair Cinema**

BRISBANE 29-30 March, 1-2 April • **Brisbane Powerhouse**

CAIRNS 7 March • **Cairns Performing Arts Centre**

GOLD COAST 11-12 March • **Home of the Arts**

NOOSA 18-19 March • **The J**

TOWNSVILLE 6 March • **Civic Theatre**

ADELAIDE 21 March, Matinee & Evening • **Capri Theatre**

BURNIE 26 February • **Metro Cinemas**

HOBART 7 March • **Farrall Centre, The Friends School**

LAUNCESTON 27 February • **Tramsheds**

GEELONG 27 March • **Village Cinemas**

MELBOURNE CITY 24 March • **Village Crown Cinemas**

MELBOURNE 25-26 March • **The Astor Theatre**

MORNINGTON PENINSULA 28 March • **Peninsula Cinema Rosebud**

WARRNAMBOOL 28 March • **Lighthouse Theatre**

ALBANY 26 February • **Albany Entertainment Centre**

BROOME 29 February • **Sun Pictures**

BUNBURY 28 February • **BREC**

GERALDTON 7 March • **Queenspark Theatre**

MARGARET RIVER 25 February • **Margaret River Cultural Centre**

PERTH 3-6 March • **State Theatre Centre of WA**

Photo credit: Rinaldi Santi

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DATES: JULY–AUG 2020

Swim with the humpbacks of Tonga

Join Canon Master photographer Darren Jew and his team for another unforgettable adventure with humpback whales in Tonga's Vava'u group of islands in 2020. This 12-day tour includes local activities and optional photo sessions with Darren and co-host Jasmine Carey.

WHO: Darren Jew's Whales Underwater
DATES: 2 July–Aug 2020
COST: From US\$7580 ex Vava'u, Tonga
BOOKINGS: Call 0415 932 273 or email (see below)

BOOKINGS: reservations@whalesunderwater.com



DATES: AUG–SEPT 2020

Lightning Ridge fossil digs

The Society offers you a chance to hunt for rare opalised fossils. Guided by experts, you'll discover new specimens for the Australian Opal Centre's world-leading museum collection. Enrich your knowledge of opals and gems, opal-mining history, opalised fossils and new dinosaur discoveries.

WHO: Australian Opal Centre
DATES: 26–31 August 2020 or 2–7 September 2020. Week 2 is available for return participants only
COST: \$2200pp. Includes all activities, lunches, most dinners
BOOKINGS: Call 0427 904 587 or email (see below)

BOOKINGS: dig@australianopalcentre.com

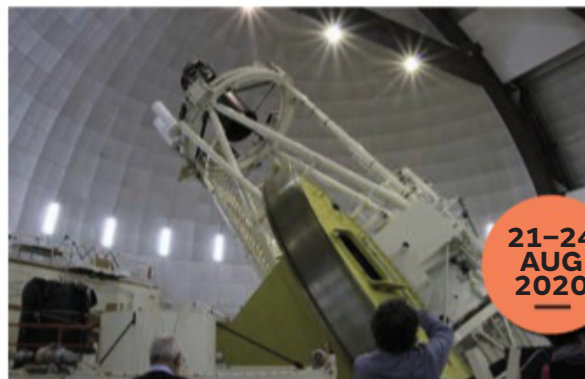


**21–26
SEPT
2020**

Australian Geographic Expedition to Lord Howe Island

It's an exciting time for Lord Howe conservation. Following rodent eradication last year, we expect much change to bird life. Over six days, the expedition will survey the established Birdlife Atlas sites from North Bay to Mt Gower's summit to help study populations of local and migratory birds. We hope to find species that are: recovering in existing breeding grounds; expanding into to new grounds; or perhaps new to the island or returning after disappearing following the introduction of rodents in the 1920s.

DATES: 21–26 September 2020
WHO: Pinetrees
COST: From \$4743pp (twin share), excluding airfares
BOOKINGS: Call 02 9262 6585, email info@pinetrees.com.au or visit pinetrees.com.au



**21–24
AUG
2020**

Explore Australia's night sky

Explore the night sky with Fred Watson, Australia's Astronomer-at-Large and AUSTRALIAN GEOGRAPHIC's specialist space writer, on a Melbourne University Citizen Science project. Enjoy a behind-the-scenes look at the telescopes of Australian National University's Siding Spring research facility, outside the NSW town of Coonabarabran, learn about astrophotography and stargaze like an expert, plus so much more.

DATES: 21–24 August 2020
COST: From \$1690pp, includes all activities and most meals
BOOKINGS: Call 1300 707 313 or email marnie@darkskytraveller.com.au



**7–9
OCT
2020**

Aussie Ark experience

Join Tim Faulkner for a unique hands-on experience with this breeding program for the Tasmanian devil and eastern quoll in the beautiful Barrington Tops of NSW. You will see devils up-close, as you help with feeding and monitoring individuals. There'll also be opportunities to explore the region's natural treasures and spot local wildlife at night. Don't miss your chance to get involved.

WHO: Aussie Ark
DATES: 7–9 October 2020
COST: From \$1400pp
BOOKINGS: Call 02 4340 8610 or email admin@devilark.org.au

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CANBERRA National Film & Sound Archives • 13-17 May

ALBURY Entertainment Centre • 20 May

AVOCA BEACH Avoca Beach Picture Theatre • 15 May

BYRON BAY Byron Theatre • 8 & 9 May

COFFS HARBOUR Jetty Memorial Theatre • 27 May

DUBBO Regional Theatre • 28 May

KATOOMBA United Cinemas • 13 May

NEWCASTLE Event Cinemas Kotara • 13 & 14 May

ORANGE Civic Theatre • 29 May

SYDNEY Seymour Centre • 5- 9 May

SYDNEY EAST Randwick Ritz Cinema • 12 & 13 May

SYDNEY NORTH Hayden Orpheum • 29 April - 1 May

SYDNEY WEST Q Theatre Penrith • 30 April

WAGGA WAGGA Civic Theatre • 21 May

WOLLONGONG Uni Movies UOW • 14 May

ALICE SPRINGS Araluen Arts Centre • 29 May

DARWIN Deckchair Cinema • 26 & 27 May

BRISBANE Brisbane Powerhouse • 5 - 9 May

CAIRNS Cairns Performing Arts Centre • Matinee and Evening 23 May

GOLD COAST HOTA: Home Of The Arts • 19 & 20 May

NOOSA The J • 6 & 7 May

TOWNSVILLE Civic Theatre • 20 May

ADELAIDE Capri Theatre • Matinee and Evening 23 May

HOBART The Farrall Centre, The Friends School • 30 May

LAUNCESTON Princess Theatre • 15 May

BALLARAT Regent Cinemas • 11 June

GEELONG Village Cinemas • 5 June

MELBOURNE CITY Village Crown Cinemas • 1 & 2 June

MELBOURNE ST KILDA Astor Theatre • 3 & 4 June

MT BULLER Mt Buller Cinema • 27 June

ROSEBUD Peninsula Cinemas • 6 June

WARRNAMBOOL Capitol Cinema • 10 June

ALBANY Entertainment Centre • 23 May

GERALDTON Queenspark Theatre • 22 May

PERTH State Theatre Centre of WA • 2-6 May

Image © Ben Tibbetts

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Photography on Lord Howe Island

Lord Howe Island is one of Australia's best photography destinations. It's World Heritage-listed because of its scenic beauty, biodiversity and rare flora and fauna and offers a large variety of terrain in a small area. Walking and Photography Weeks combine the skills of local guides and photographers to help you discover and capture the island's

stunning landscapes and life forms. Most walks have expert guides to explain the plants, geology, birds and marine life. Amazing photos are guaranteed.

WHO: Pinetrees

DATES: 11–15 May; 9–13 Nov 2020

COST: From \$3048pp (twin share)

BOOKINGS: Call 02 9262 6585

or email info@pinetrees.com.au or visit the website (see below)

 pinetrees.com.au



Arnhem Land expedition cruise with APT

Explore Arnhem Land's remote coastline and the pristine Tiwi Islands on an eight-day small ship expedition aboard MS *Island Sky*. Land on the Gove Peninsula and experience a Welcome to Country ceremony on South Goulburn Island. Get a bird's-eye perspective of Arafura Swamp on an included scenic flight, and see 60,000-year-old art styles

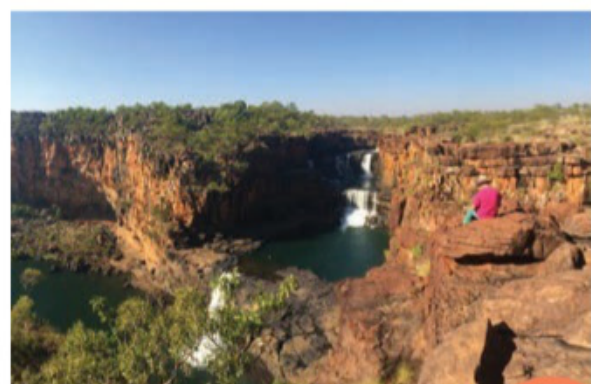
take shape before your eyes. Enjoy an all-inclusive lifestyle on board where everything is taken care of for you.

WHO: APT **DATES:** Departs 29 June and 25 July 2020

COST: From \$9395*pp (twin share), save \$2000* per couple (already included in price shown). *T&Cs apply

BOOKINGS: Call 1300 184 577 or visit the website (see below)

 aptouring.com.au/ArnhemLand



The definitive Kimberley

The Kimberley in WA has one of the world's wildest coastlines, much of which is accessible only by sea. Coral Expeditions cruises explore a rugged land carved by nature where Earth's oldest living culture is recorded in rock-art galleries thousands of years old. Cruising the Kimberley expedition-style includes waterfalls, wildlife and tidal streams that twice daily conceal and reveal an ancient landscape where Indigenous connections and European history abound.

WHO: Coral Expeditions

DATES: April–September 2020

COST: From \$10,290pp

BOOKINGS: Call 1800 079 545, email explore@coralexpeditions.com or visit  coralexpeditions.com



Circumnavigate Australia

The year 2020 is the 250th anniversary of Captain Cook's landing, 200th anniversary of Phillip Parker King's explorations and 35th anniversary of Coral Expeditions. Sailing aboard *Coral Adventurer*, you'll start this 60-day voyage from Darwin and visit 35 places of significant maritime and cultural heritage that have shaped Australia, many of which are difficult to reach by land. Special highlights include a Winemaker's Dinner at Leeuwin Estate Winery in WA and Christmas Dinner under the stars at Uluru, with private jet transfers.

WHO: Coral Expeditions

DATES: 7 November 2020–5 January 2021

COST: From \$38,860pp

BOOKINGS: Call 1800 079 545, email explore@coralexpeditions.com or visit  35.coralexpeditions.com

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The art of AUSTRALIAN GEOGRAPHIC

AG's archives are a treasure trove of scientific illustration and botanical and zoological art. Here we revisit some of the highlights from our vast collection.



Watson's Pier

**Anzac Cove, 1915,
by Ev Shipard, from
Beneath Gallipoli, AG 102
April–June 2011.**

IN A DEPARTURE from our more literal style of illustration, this impressionistic representation of a scene from the 1915 Gallipoli Campaign of World War I was commissioned by AUSTRALIAN GEOGRAPHIC for the opening spread of a feature about Project Gallipoli, an archaeological exploration of the waters beneath Anzac Cove that was being undertaken by a team of Turkish and Australian marine archaeologists. An expedition to support the project was sponsored by the Australian Geographic Society and involved photographic documentation of its findings by regular AG underwater photographer Mark Spencer. Illustrator Ev Shipard (pictured top) spent countless hours researching old WWI photos in Australian War Memorial collections, as well as Mark's photos from the expedition, to create the scene you see here. It shows a makeshift wharf constructed by Australian Imperial Force sappers and one of the barges used to evacuate wounded servicemen from the battleground to hospital ships anchored offshore. A similar barge was discovered by the Project Gallipoli expedition team, still in situ and intact in 55m of water on the seabed, 2.4km from the cove.

Visit:  agad.anzac.unimelb.edu.au to access the Anzac Gallipoli Archaeology Database.

A PORTRAIT OF AUSTRALIA

STORIES THROUGH THE LENS OF AUSTRALIAN GEOGRAPHIC

Discover the remarkable stories of ordinary Australians in this exhibition celebrating the bush, the outback, the coast and the people who live there.



EXHIBITION ON SHOW

BRIBIE ISLAND SEASIDE MUSEUM | BRIBIE ISLAND, QLD | 28 February – 24 May 2020

REDLAND ART GALLERY | CAPALABA, QLD | 23 May – 11 July 2020

A travelling exhibition from the National Museum of Australia developed in collaboration with Australian Geographic. Photograph by Colin Beard.
nma.gov.au/portrait-of-australia



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